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FLIGHT

MAGAZINE

SEPTEMBER 1952

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AG-14 TWO-PLACE PUSHER

(See page 20)

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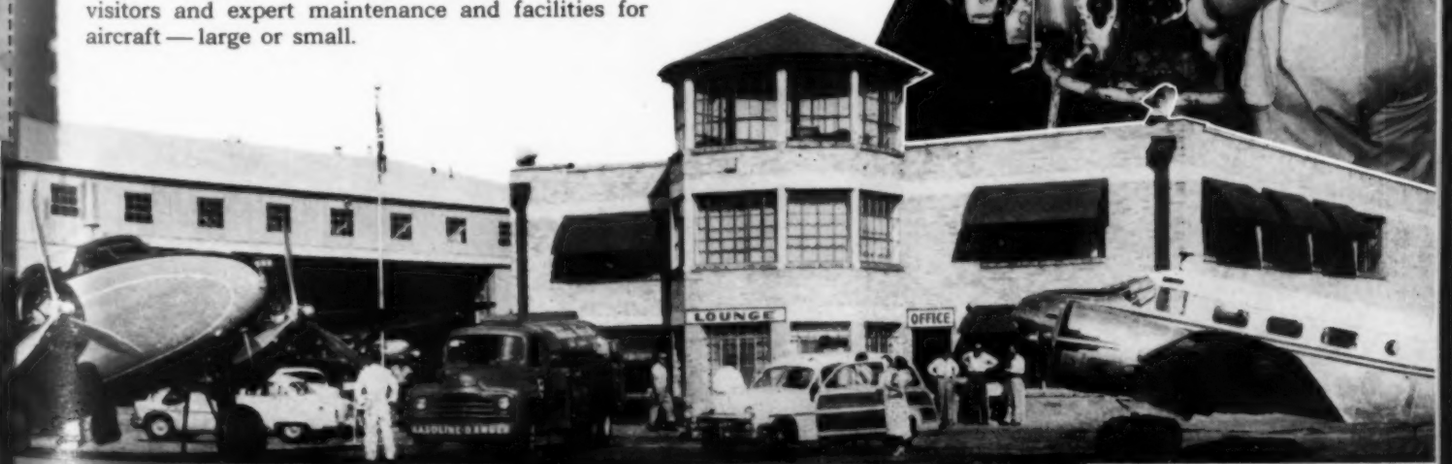

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The day of the business airplane is really here. Company after company—large and small—has found that only private company planes give the time-saving speed and flexibility so necessary in all phases of business today.

And more companies are buying Cessnas than any other make of plane in the world. For Cessnas are definitely designed for business use. All-metal for greater safety, lower maintenance. High-wing for increased stability, greater visibility. Fast . . . yet designed for safe short-field landings and take-offs. Completely practical for large businesses and small!

THESE BUSINESSMEN are among the thousands who are using Cessnas every day of the year to step up sales . . . speed up production . . . lower costs . . . and increase profits!

Automobile Dealer! Luther Hinkson closes deals all over Arkansas by flying a Cessna, takes prospective customers on good-will flights.

Contractor! Dominic Cenci uses his Cessna to supervise widely scattered jobs, speed payrolls to crews "on location," visit suppliers.

Lumberman! Don Wallace covers the U. S. in his Cessna, says "More calls automatically mean more sales. That's why my 170 is so important to me!"

in Private

CESSNA 170: All-metal, 4-passenger business liner. Super-Lift Flaps, patented Safety Landing Gear. Luxurious interiors. 15 airline miles per gallon of gasoline. $7,245 f.o.b.* Wichita.

Manufacturer! After years of flying, New Holland Machine Co. President George Delp says, "We'd be lost without our Cessna."

Engineering Firm! With three Cessnas, Refinery Engineering Co. quickly reaches remote construction sites, saves countless man-hours.

Implement Dealer! Tony Schartz dreads highway travel, took to flying a Cessna to reach more prospects, rush spare parts, boost profits.

Farmer! Noble Wynn of Edmond, Okla., flies ... calves hundreds of miles in his Cessna 170 makes regular aerial farm checkups.

It's easy to put yourself in this picture! For complete case histories on Cessna owners in businesses similar to your own, see your Cessna Dealer (listed in the yellow pages of your phone book) or write:

CESSNA AIRCRAFT CO.
DEPT. 77 WICHITA, KANSAS

YOU'RE *THERE* WITH A

Cessna

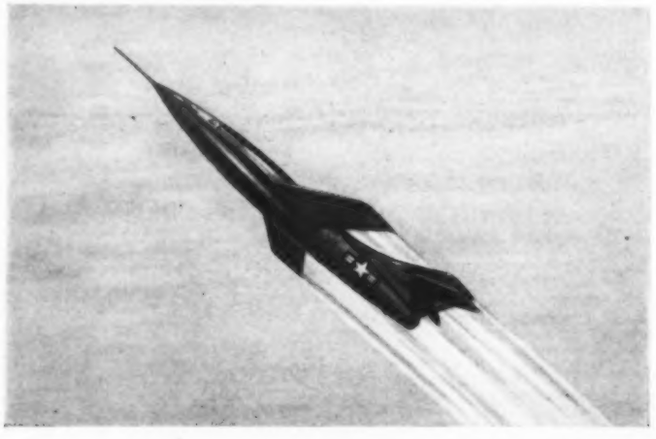
(*Standard equipment — prices subject to change without notice.)

High Flyer 1920

A daring flyer of the twenties, Major Rudolph ("Shorty") Schroeder, sent his super-charged Le Pere plane to its utmost ceiling of 38,180 feet back in 1920 to set a new world record! He received nation-wide acclaim for one of the greatest feats of the day!

High Flyer 1951

Another day, another record! Just thirty-one years later at Muroc Dry Lake, California, the U. S. Navy's *Skyrocket* powered by 4 rockets and air launched from a modified B-29 bomber, soared into space at "unprecedented" heights and speeds, topping *all* previous speed and altitude records.



● This remarkable thirty-year record of progress is indicative of the course that lies ahead! There is *no limit* to the vistas that may be opened up for those who fly!

And future improvements in design, speed and endurance of planes will be matched by equally important developments in aviation fuels.

Phillips Petroleum Company will continue to contribute to this progress according to the very latest demands of modern aviation. As one of the nation's largest suppliers of dependable aviation products for commercial and military use in all ranges of flight, Phillips is ready today with new fuels for the latest turbo-props and jets . . . in addition to tremendous capacity for producing 115/145 grade aviation gasoline. When you want *dependable, high-performing* aviation products—call on Phillips!

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PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA

Phillips 66

AVIATION PRODUCTS

AIR Report

Significant Trends and News

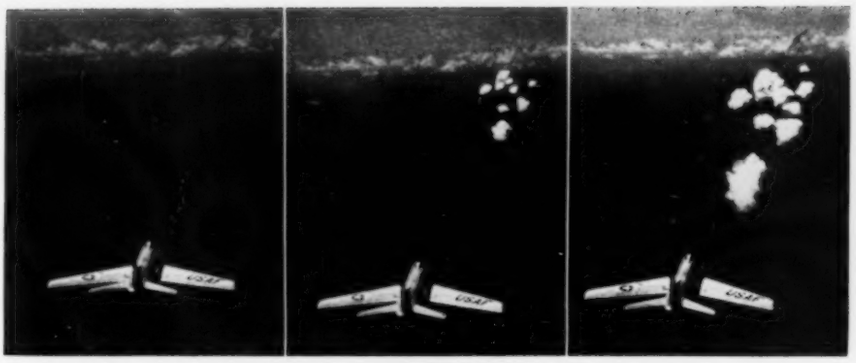
BONANZA OPERATING COST AND UTILIZATION AVERAGES plus other interesting facts about Bonanza operation have been obtained by Beech Aircraft Corporation in its 1952 survey of Bonanza owners, conducted by Leddy Greever, sales manager. Total time on Bonanzas now operating averages 633 hrs. per ship, and they are being flown an average of 247 hrs. annually, with average trip distance being 372 miles, ground speed being 155 mph., fuel consumption 9.74 gals. per hr., number of passengers 2 per trip, and 74 lbs. of baggage per trip. Cost averages from Bonanza owners are $26 monthly for storage, $93 for a 100-hr. inspection, $557 annually for insurance premiums, and $436 monthly for pilot salaries, 22 per cent of Bonanza owners having salaried pilots. Most owners (62%) use Bonanzas for business and pleasure, 35% using them for business only and only 3% using them for pleasure only. Greever says facts uncovered in the survey are being used in factory planning and "will be used whenever it becomes practical and feasible for Beechcraft to design and produce a new model Bonanza." The figures, he emphasized, are averages as reported from owners.

USAF PURCHASE OF 270 PIPER TRAINERS heralds a new Air Force Training Command program in which future cadets will get their first 25 hrs. of flight training in 90-hp. lightplanes before starting from scratch in 650-hp. T-6 trainers as at present. Only changes in the trainers from the civilian version of the same Cub are toe brakes and bucket seats for parachutes. Deliveries will be made next Spring, the Cubs going to the 9 civilian contract schools now giving Air Force cadet training.

TEMCO PRODUCTION OF McDONNELL F3H DEMON JET FIGHTERS FOR NAVY has been ordered following long Navy preparations in equipping the Dallas plant with latest machinery and tools and signing of a licensing agreement and contract last month. Four hundred workers were to be added immediately, with the payroll expected to reach 10,500 persons by 1954. Bob McCulloch, Temco president, said his plant is now far better equipped for output than it was at the height of its World War II output of North American fighters and trainers. F3H performance exceeds that of both earlier McDonnell Navy fighters, the Phantom and Banshee.

WITH 24 AIRPLANES DELIVERED AS OF SEPTEMBER 1, Aero Design and Engineering Co., at Oklahoma City is scheduled to up output of twin-engine Aero Commanders to 6 in September, 7 in October and 8 in November, maintaining a 2-a-week rate thereafter. Rufe Amis, president, says his work force is over 500 people. Orders now being accepted are for delivery next February, he said. One

(*Continued on page* 32)



ONE-MAN AUTOMATIC ROCKET INTERCEPTOR at work is shown in these sequence photos of a North American F-86D over the Gulf of Mexico off Florida. "D" Sabre carries 24 rockets which are fired automatically when radar finds target within range. Ten are shown being fired. Single-seater "automatic" Sabre carries no radar operator.
—(North American Aviation Photos by Bill Susoeff.)

FLIGHT MAGAZINE

Including SOUTHERN FLIGHT and MODERN AIRPORTS

SEPTEMBER, 1952 VOL. 38, No. 3

COVER: A pictorial shot of the Anderson-Greenwood AG-14, 2-place, 90-hp. pusher of radical design, at the Eagle Rock Ranch air strip near Austin, Texas. This airplane has been issued a CAA approved type certificate but has not been placed on the market due to the pressure of defense work by the Anderson-Greenwood Co., Houston, Texas.
—(FLIGHT MAGAZINE Photo by E. H. Pickering.)

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Another First for Allison

1,000,000 hours in the air for J33 Turbo-Jet engines

Allison jet engines were the first to accumulate a million hours in the air. Now Allison J33 jets *alone* have surpassed this figure. In addition, Allison J35 engines are fast approaching the million-hour mark.

Records like these are further proof that Allison leads the world in experience—where it counts most—*in the air!*

Thousands of hours on the Allison J33 are being accumulated in Lockheed Shooting Stars on tank-busting sorties behind enemy lines in Korea.

GM GENERAL MOTORS

Allison

DIVISION OF GENERAL MOTORS
INDIANAPOLIS, INDIANA

Designers and Builders of J35 and J71 Axial, J33 Centrifugal Turbo-Jet Engines, T38 and T40 Turbo-Prop Engines

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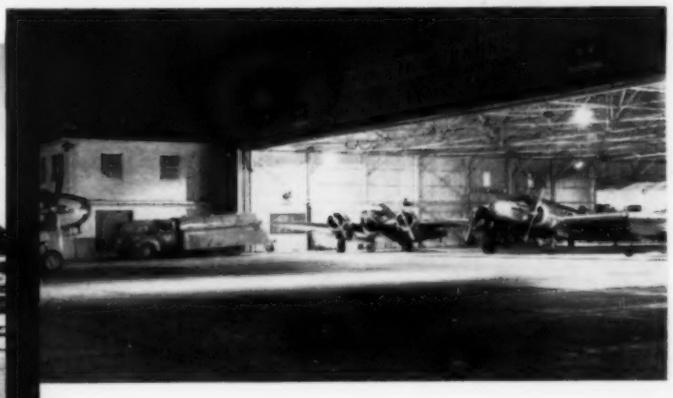

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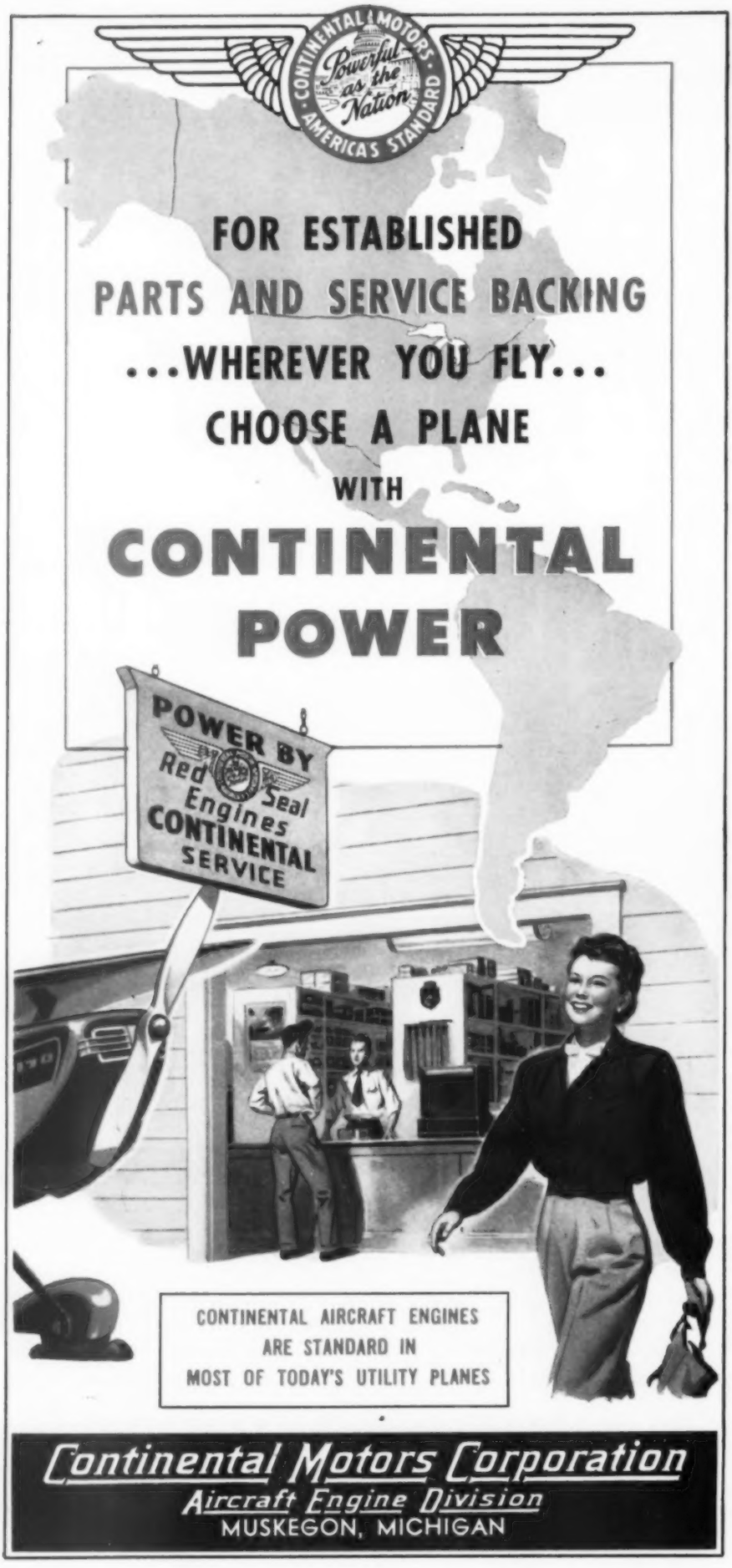


Airmen's Calendar

Sept. 9-11—International Northwest Aviation Council Annual Convention, Great Falls, Montana.

Sept. 13-14—Texas Private Fliers Association Flight Party, Flying L Ranch, Bandera, Texas.

Sept. 30-Oct. 2—Aircraft Spark Plug and Ignition Conference, sponsored by Champion Spark Plug Co., Toledo, Ohio.

Oct. 1-4—SAE National Aeronautic Meeting, Hotel Statler, Los Angeles, Calif.

Oct. 9-10—Annual Airport Management Operations Conference, University of Oklahoma, Norman, Oklahoma.

Oct. 11-18—4th All Texas Air Tour.

Oct. 25-Nov. 2—International Aviation and Travel Exposition, Navy Pier, Chicago.

Oct. 28-29—Transport Aircraft Hydraulics System Conference, sponsored by Vickers, Inc., Hotel Park Sheraton, Detroit.

Nov. 6-7—SAE National Fuels and Lubricants Meeting, Mayo Hotel, Tulsa, Okla.

Elliott J. Farrell New Eastern Representative For FLIGHT MAGAZINE

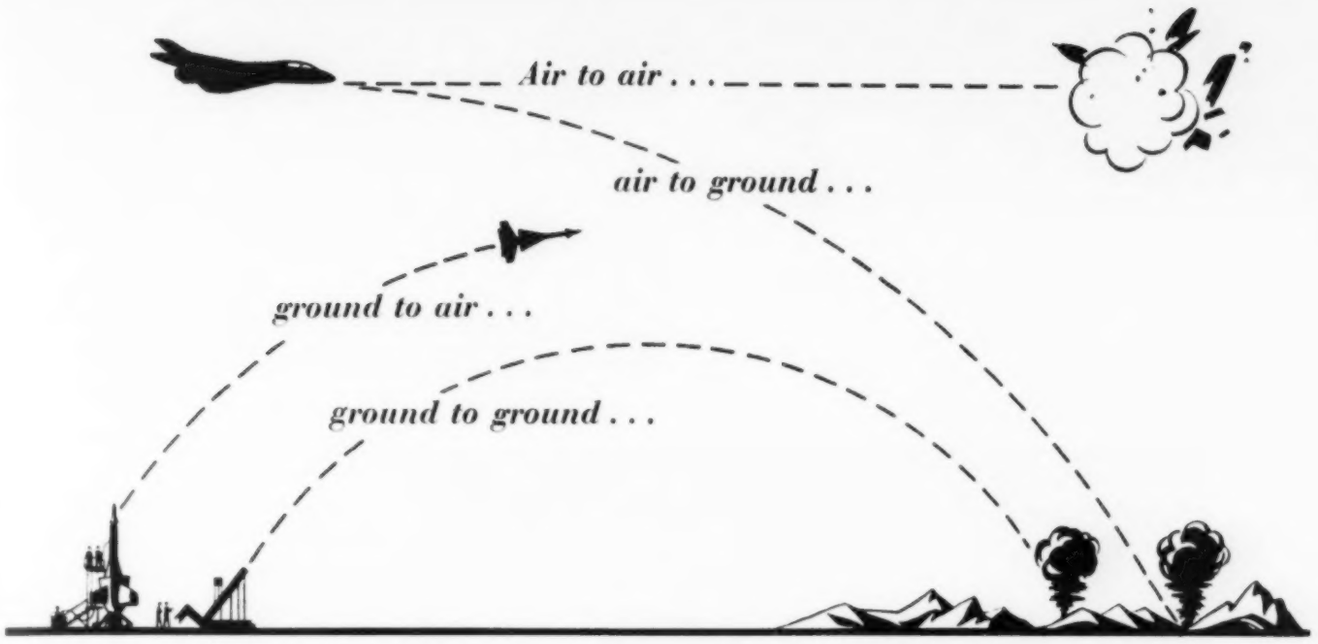
Elliott J. Farrell

Elliott J. Farrell, in charge of aviation accounts with Erwin, Wasey & Company for the past eight years, has joined the staff of FLIGHT MAGAZINE as Eastern Advertising Manager with offices in the Chanin Building, 122 E. 42nd St., New York City.

Prior to his affiliation with Erwin, Wasey, Farrell was an account executive with McCann-Erickson, Inc., for twelve years.

While with Erwin, Wasey, he had complete charge of aviation accounts which included both civil and military manufacturing, aircraft instrument and accessory manufacturing, aviation petroleum products, scheduled air transport and air express.

Born in Chicago, Farrell moved to New York at an early age and received a Bachelor of Science degree from New York University. He is married and lives in Hollis, New York.



Douglas Guided Missiles

Increasingly important to the nation's defense, guided missile research and development has been a vital project at Douglas for more than ten years.

During this time, Douglas engineers have helped develop missiles for both Army Ordnance and Navy—for all basic uses. Some to be fired from planes *at* planes . . . some from planes at surface targets . . . from the ground at aircraft . . . and from the ground at surface targets. Douglas has contributed to the science of automatic control, guidance, propulsion, and supersonic aerodynamics—and has developed automatic computers needed in guided missile design.

Development of new guided missiles is further evidence of Douglas leadership, and now that the time to produce missiles *in quantity* has come, Douglas manufacturing skill is ready for the job.

PRODUCTION FOR FREEDOM
Week of September 7-13

Depend on *DOUGLAS* First in Aviation

Incomparable

a pretty girl

Since the only thing prettier than one pretty girl is two pretty girls, and also since this is the last of our series, we're letting you see double this time. Our twin cowgals are Jean and Joan Jackson, 18, brown-eyed and blonde. They graduated this year from high school where they were twin band majorettes. Jean and Joan like to dance and wear identical clothes. (If you liked our lovely Dallas lasses, how about dropping us a note?).

Incomparable

A "Twin Beech"
100-Hour Inspection
By Southwest Airmotive.

SOUTHWEST AIRMOTIVE COMPANY

LOVE FIELD • DALLAS

Just among ourselves

EDITORIALS

THIS MAKES SENSE

REASON and reality are returning to the U. S. Air Force pilot training program as indicated in announcement that Piper Aircraft Corporation has received a contract for 270 90-horsepower tandem trainers, which are to be used in a brand-new aviation cadet screening program by the nine USAF basic contract flight schools.

Although the Air Force has not announced a detailed curricula for the new program, students will receive 25 hours in the Piper trainers, followed by the regular 17-week course and 120 hours in the T-6. It appears that instructor-student ratios will remain the same and the same instructor will carry his students through both phases of instruction. The lightplane training will get under way next Spring and centralization of all preflight at several schools is expected to precede the lightplane training by some months.

Actually the re-entry of the lightplane into Air Force aviation cadet training simply interposes lightplane screening after the preflight screening and before T-6 training. The emphasis is entirely on screening—not training. The T-6 is still the great, almighty trainer—the magnificent crucible which is supposed to turn out competent military pilots. The Air Force doesn't seem to be interested in or impressed by the many valuable by-products offered only by light trainers. In our opinion they will, if honest, soon come to admit that it's going to be easier to procure cadets with the lightplanes and the end product is going to be far superior to those they have been turning out during the past couple of years when the T-6 was used alone. But that remains to be seen. The very fact that they have, at long last, re-introduced the light trainer into the military pilot training program is a source of considerable satisfaction if for no other reason than the money it will save in wash-outs.

Surely we can now expect renewed interest in legislation for Air ROTC flight training and other civil flight training programs which went down in defeat during the last session of Congress, when the Defense Department, with the Air Force as spokesman, ironically gave the kiss of death to the legislation. Since lightplane training can be a major key to the cadet procurement problem, maybe the U. S. Air Force's belated employment of the little trainers in their new screening program carries with it deep significance. Maybe more reason and reality will be in evidence farther down the line in tapping the rich well-springs of American youth that can't be tapped by fancy advertising slogans dreamed up by Madison Avenue hucksters.

POP GOES WEST

THE death last month of the nation's oldest active pilot, E. W. (Pop) Cleveland, vice president of the Cleveland Pneumatic Tool Company, removes from the aviation scene one of the most picturesque and grandest of the old-time fliers who pioneered this business from the Wright Brothers and Curtiss era, through the barnstorming days and led it vigorously into one of the greatest industries in human history.

Pop learned to fly at Hammondsport, New York, in 1912 and logged more than 10,000 hours in his 41 years of active pilotage, most of which was amassed in the pursuit of his sales work for Cleveland Pneumatic. He crashed in a fog August 7 on Mount Baldy near Seattle, Washington. With him was his wife Lucille, better known as "Mom", and his secretary, Mrs. Annabelle Elmslie. The tragedy occurred almost an exact year from the day Pop was honored at a testimonial dinner given by several hundred friends celebrating his 40th year in aviation.

Pop unknowingly carved a permanent niche for himself in aviation's hall of fame, but it's in the hearts of his fellow fliers that he'll receive his share of immortality. That thought is best expressed in a little poem sent to FLIGHT MAGAZINE by one of Pop's hometown friends and fellow fliers, which reads:

They broke the mold when they made him
Lanky and limping and slim,
With odd goatee and Eternity
Looking out from under the brim.

Of the wide Stetson, his trademark,
With a half-chewed cigar in his lips,
He saw right through you — you knew it;
He cared not a hoot for your quips.

He loved life and people and airplanes,
Cared nothing for glory or gain.
He had guts and plenty of them,
And compassion for those in pain.

He lived life through the hilt and the handle;
He kidded, he razzed and he joked;
But underneath all he was serious,
A genius unprovoked.

So here's to you Pop—grand old goat!
The man at the top of the sphere.
A real right guy who never will die
In the hearts of the gang left here!

FOR SIMPLER NAVIGATION

REMEMBER the old days when you flew by Rand McNally maps, long before the Coast and Geodetic Survey published aeronautical charts? After a couple of years of hard selling, the Coast and Geodetic have agreed to adopt for sectional charts one of the oldest practices of mapping—the use of simple numerical

(Continued on page 36)

Tops on Texas Skyways

Humble-Esso aviation dealers are ready to serve you with a line of quality products at 74 fine airports in Texas—from Brownsville to Lubbock and Mineola to Ft. Stockton. Humble aviation fuels and lubricants for private and commercial flying have passed the test of service, giving excellent performance with low maintenance costs. The sign of the Humble-Esso wings is synonymous with products proven in flight. Choose from this complete line of Humble-Esso aviation products:

- ☆ Gasoline in three grades
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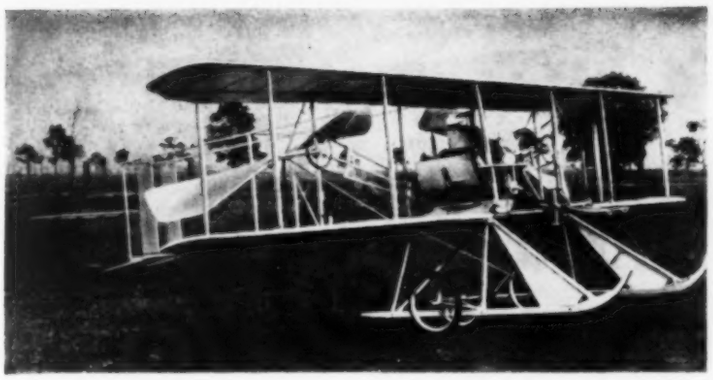
- ☆ Rust-Ban 624 and 625 to check corrosion in engines during storage and shipment
- ☆ Specialty oils such as compass fluid and instrument oils

HUMBLE OIL & REFINING COMPANY



THEN and NOW

Dependability Comes First!

SINCE the Navy began flying wheeled aircraft in 1911 with the Wright Brothers B-1, they've always been sticklers for dependability —just as they are today with the "Skyshark," first Turbo-Prop shipboard fighter to join the fleet. And ever since Goodyear built the first Wing Airplane tire for the early Wright ships, dependability has been the watchword here, too.

The Douglas A2D "Skyshark" is the latest in a long line of Navy planes 100%-equipped with Goodyear Tires, Tubes, Wheels and Brakes—selected again for their proved ability to withstand the strains of carrier deck landings and take-offs.

Wherever greater safety and dependability are concerned, Goodyear equipment gets first call—in military and naval service as well as on commercial and private craft. For further details on any Goodyear product for aviation — tires, tubes, wheels, brakes, bullet-sealing tanks, Iceguard equipment and Airfoam Super-Cushioning—write:

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Akron 16, Ohio or Los Angeles 54, California

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Iceguard, Airfoam—T.M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

The Philosophy Behind My New 4-Place Design

Private flying's newest high-performer will soon be in the air—here's a preview of its features

By AL W. MOONEY

FLIGHT MAGAZINE some months ago revealed our development of a new 4-place airplane for the commercial market. Since then I have been asked many questions by friends. My answers generally launch an all-night gab-fest. New designs are that interesting. But I'll try to spare the reader all the excess stuff and get down to essentials. What people are interested in is the philosophy behind my new design. If those interested in 4-place progress will pull up a chair, let's discuss our new design.

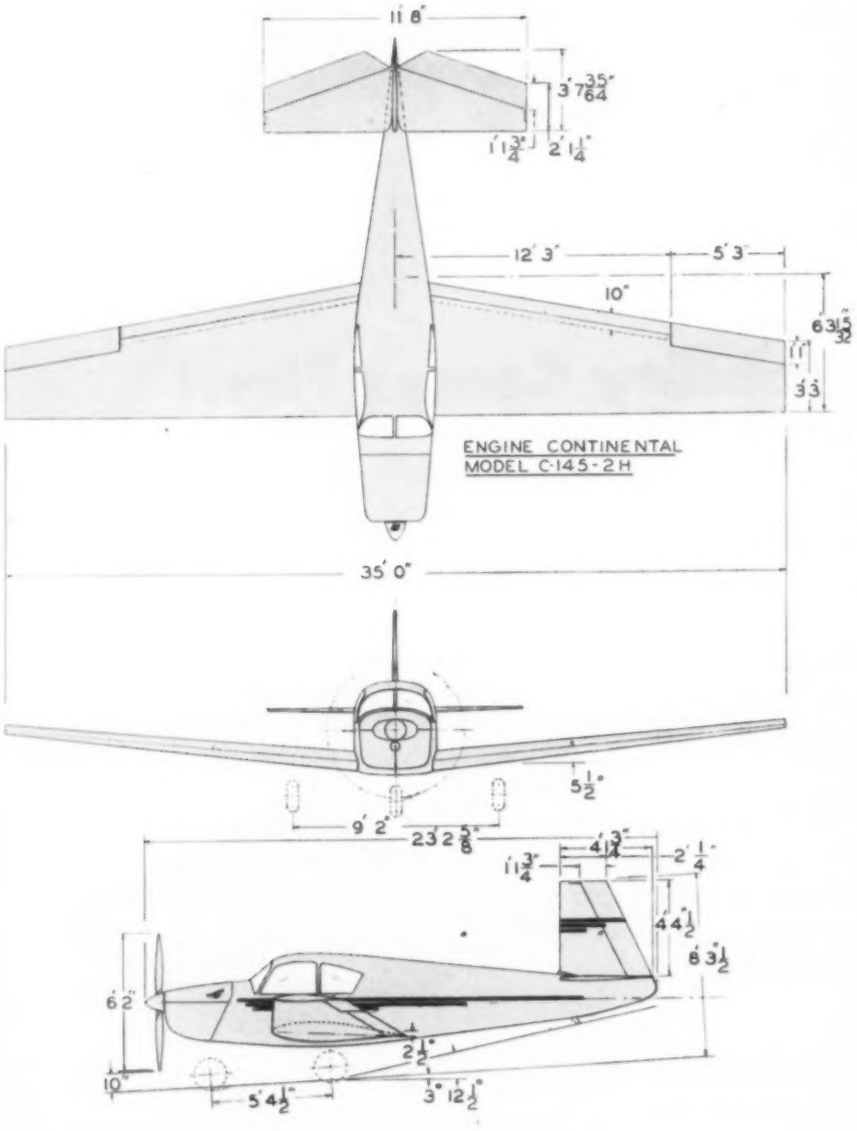
First, I believe this is a good time to bring out a new 4-place design despite the so-called low volume and high-pitched competition in the market. In fact, I am convinced there was never a better opportunity than now to offer private plane users something really new and really useful in their flying. If commercial aviation is ever to get anywhere, it must keep new ideas and designs constantly in motion. We are still an engineering industry—we are NOT a production industry which can afford to "freeze" an airplane design and grind it out like sausages. This was tried in the 2-place field and look what happened.

However, there must be more than mere desire to justify a new airplane design. To win acceptance, it must be a better airplane. My own design goal is to offer more in a 4-place than anybody else has offered. "More" in this case is determined from my 28 years in the industry plus a thorough study of this industry's ups and downs. From such things I came up with 17 basic requirements for my new design. They are as follows:

1. The aircraft must be as far into the high performance field as technically possible, while remaining in the medium-to-medium-high-price bracket in its prototype form.

2. To accomplish Point 1, its aerodynamic cleanness must be a definite advance, while its structural efficiency must be such that its loaded weight be held to a value consistent with the ability of engines in the medium-priced field to supply the desired high performance.

3. It must be a full 4-place air-



Three-view shows Model 20's resemblance to famous Mooney Mite single-seater. It is nearing completion in Wichita factory.

craft, with adequate baggage and equipment allowance with fuel for at least a 500-mile cruising range.

4. The basic layout must be so arranged that it may be extended into the maximum-performance, high-cost, deluxe market by increasing engine size and power, along with a moderate structural weight increase, without basic re-design.

5. Because of Point 4, the cabin size and arrangements for comfort, baggage and equipment must approximate the deluxe standards.

6. Flight and handling qualities must be of the finest. This item requires that the standards in this respect set by the single-seater Mooney Mite be duplicated.

7. This airplane must be able to operate from small fields better than competitive aircraft. Its landing speed should not exceed 45 mph.

8. Ground handling must be very simple and safe even in high winds. This requires tricycle landing gear. For low drag requirement, landing gear must be completely retractable.

9. It is desirable that excess strength and impact resistance be provided in the cabin structure.

10. Maximum safety in operation must be a design keynote.

11. Vision from the cabin must be an advance over the general standards now prevailing.

12. The structural type of design shall allow maximum development of performance under these requirements.

13. Maintenance and servicing shall be of prime design consideration. Ruggedness and design simplicity must be attained.

14. Useful load distribution shall be arranged to eliminate restrictions in loading due to balance and trim requirements.

15. The entire cabin interior shall be free from structural obstructions in order that maximum utility for cargo and special purpose loadings is not restricted.

16. The cabin door shall be large and so located that all seats may be reached or vacated in a dignified manner.

17. External lines, window lines and general "eye appeal" must be second to none in the 4-place class.

Translating all of these rigid and in part conflicting requirements into a final and exact design has taken months of research, study, design calculations and layout drawings. This is now behind us, and we are well along with construction of the prototype, which will soon fly. But to continue with the philosophy, let's go further behind the scenes and consider the process of coming out with a new design in the 4-place category.

In translating our requirements, with an open mind and from an objective standpoint, two major problems became clear from the start. Problem No. 1—the configuration must insure the lowest drag practically possible at the present state of the art. Problem No. 2—the design scheme of structural arrangement, selection of construction materials, and basic design layout must result in a substantial improvement in structural weight while maintaining high strength.

The accompanying detail drawing shows the result of our basic decisions —a low-wing, internally-braced monoplane configuration incorporating a

Prototype Specifications and Performance

MOONEY SERIES TWENTY

(Factory Data)

Type: Four-place, low-wing, internally-braced cabin monoplane with laminar-flow wing and flush retractable tricycle landing gear.

WEIGHTS

Normal empty weight with radio equipment, lbs.	1,049
Useful load (pilot 170, fuel 180, oil 11, 3 passengers 510, baggage 80), lbs.	951
Gross weight, lbs.	2,000

DIMENSIONS

Wing span, ft.	35
Length, ft./ins.	23/2
Height, ft./ins.	8/3
Total wing area, sq. ft.	166.9

LOADINGS

Wing loading, lbs./sq. ft.	12
Power loading, lbs./hp.	13.8
Span loading, lbs./ft.	57.1

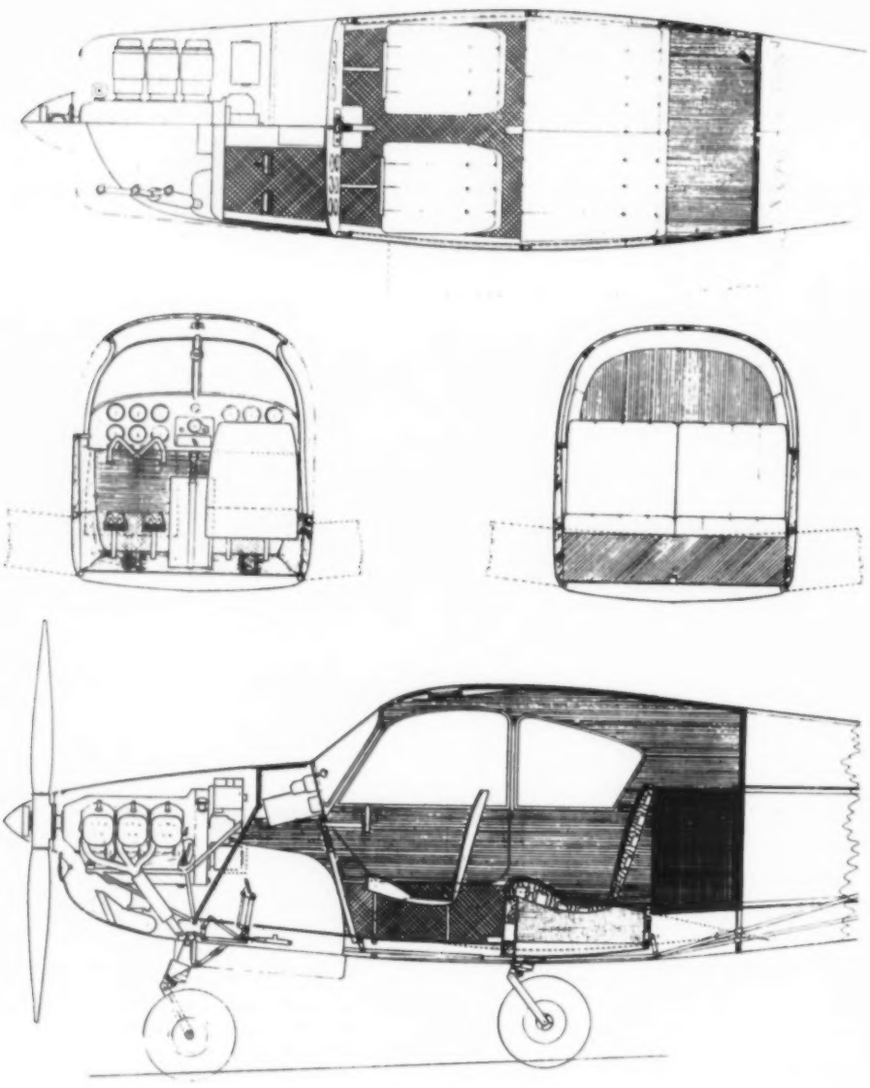
POWER PLANT

Continental C145-2H engine, rated at 145 hp. at 2,700 rpm. at sea level; propeller (standard) Sensenich CS-3F with either selective pitch or constant-speed control.

PERFORMANCE

	Standard Propeller	Metal Propeller
Maximum speed, sea level	173 mph. at 2,700 rpm. at 28.3"Hg.	176.5 mph. at 2,700 rpm. at 28.3"Hg.
Maximum speed at 4,000 ft.	170 mph. at 2,700 rpm. at 24.7" Hg.	173 mph. at 2,700 rpm. at 24.7" Hg.
Maximum speed at 8,000 ft.	165 mph. at 2,700 rpm. at 21.4" Hg.	168 mph. at 2,700 rpm. at 21.4" Hg.
Recommended cruise at sea level	143 mph. at 2,400 rpm. at 21.3" Hg. (62.5% hp.)	143 mph. at 2,400 rpm. at 20.5" Hg. (59.4% hp.)
Recommended cruise at 4,000 ft.	152 mph. at 2,400 rpm. at 21.5" Hg. (65.5% hp.)	152 mph. at 2,400 rpm. at 20.7" Hg. (61.2% hp.)
Recommended optimum cruise	160 mph. at 7,500 ft. at 2,400 rpm. at 22" Hg. (69.3% hp.)	161 mph. at 8,000 ft. at 2,400 rpm. at 20.9" Hg. (65.7% hp.)
Economy cruise at 8,000 ft.	140 mph. at 2,100 rpm. at 19" Hg. (50% hp.)	140 mph. at 2,100 rpm. at 18" Hg. (47.5% hp.)
Range at optimum cruise	533 miles in 3.33 hrs.	575 miles in 3.57 hrs.
Range at economy cruise	683 miles in 4.87 hrs.	718 miles in 5.12 hrs.
Miles per gal., at optimum cruise	17.8	19.2
Miles per gal., at economy cruise	22.8	23.9
Rate of climb at sea level, 95 mph., fpm.	1,175	1,260
Absolute ceiling, ft.	23,000	23,800
Service ceiling, ft.	21,000	21,900
Time to climb to 10,000 ft., mins.	11.13	10.26
Landing speed, 50-deg. flaps, mph.	45	45

Standard equipment (included in normal empty weight): 12-volt electrical system with battery, generator and starter, landing light, position lights and cabin and instrument lighting; ammeter, circuit breakers and switches, landing gear warning system, either a quality modern radio installation or weight and space provisions for one; compass; air speed indicator; turn-and-bank indicator; vertical speed indicator; sensitive altimeter; tachometer; oil pressure gauge; oil temperature gauge; fuel pressure gauge; fuel quantity gauges (2); manifold pressure gauge; outside air temperature indicator; cabin heating system and ventilating system.



Roominess despite compactness in these inboard profile sketches indicates ingenuity of engineering design behind the new Mooney. Nose wheel retracts into housing beneath panel. Interior width at front and rear seats is 42 ins.; headroom is 38 ins. for both front and rear; legroom is 40 ins. up front and 38 ins. in back, while seat spacing is 29 ins. Note clean lines, visibility, wide door.

completely retractable tricycle gear.

From all practical angles, this design arrangement has been proved to result in the lowest drag of all practical types. While another manufacturer has amply demonstrated this fact, to assume that the design is merely a copy of the leading contemporary would be a mistake. It is true that the contemporary has carried this type to the highest stage of current development. But it is equally true that the author has the strongest claim for origination of the type, a claim of over 20 years standing.

Laminar-Flow Advantages

What our design proposes here is to carry the type to a further stage of development. To say that the ultimate in design has been reached is to deny the existence of initiative, courage and progressive ideas in our industry.

Specifically, we base our claim for aerodynamic advance on two additional points. First, the use of low-drag laminar-flow airfoils is proposed. Second, our structural scheme allows a fuselage having only about 80 per cent of the conventional frontal area while maintaining a deluxe-size, uncluttered interior.

Laminar-flow wings have not been used in smaller aircraft to any extent. Several experiments in this direction have been tried with various results. On the other hand, great advances in speed in military and large aircraft have stemmed from this development. In fact, not until only in the fairly recent past has the NACA had the proper low-turbulence test facilities for exploring the possibilities of laminar-flow wings in the 200-mph. or lower speed range.

Designers were wary of the use of laminar-flow wings in this speed range at the time our clean and high performance contemporary 4-place aircraft was designed and tooled, believing them to be "tricky" and having poor stall characteristics, etc. Also, the requirement of a very smooth wing surface to insure laminar-flow discouraged them from adopting such sections in their designs.

However, experience is a wonderful teacher and recent NACA research has resulted in the proof that certain laminar-flow sections are very suitable indeed in this speed range, plus the proof that these laminar-flow sections possess stall characteristics quite superior to some of the airfoils now used. It is still true that they must have smooth surfaces, especially in the laminar-flow and leading edge sections. But certain so-called "conservative" sections have less critical requirements in this respect, and are particularly suited to our proven Mooney single-spar wing construction employing a thick-skinned torsion-box leading edge.

We have emphasized the necessity for reducing drag. Here's where our laminar-flow sections in the Mooney 20 really pay off in progress. Research shows these sections to have only 69 per cent of the profile drag at high speeds as for the airfoil used on the leading contemporary 4-place aircraft, for example. To bring out this advantage in a graphic, non-technical manner, the Mooney wing's 166.9 sq. ft. of area would have to be reduced to 115.2 sq. ft. using a conventional section to obtain the same high speed. Since the landing speed, take-off, climb and ceiling characteristics with such a reduced area would be impossibly poor, the alternate use of a conventional wing of the original area would

(Continued on page 47)

Military utilization of the little Hiller-Hornet ram-jet helicopter is pictured in this demonstration with a tank at Fort Ord, California. Pilot has a passenger in litter strapped to the helicopter. Skid gear as well as wheels is used.
—(Hiller Photo.)

Military Role for Ram-Jet Hiller

Commercial possibilities seen for radical lightweight design having no power transmission mechanism

TWO-PLACE ram-jet helicopters for evaluation by three military services, the Army, Navy and Marines, have been ordered in service test quantity from Hiller Helicopters. The order, placed by the U. S. Navy Bureau of Aeronautics, is the first for the HJ-1 Hiller-Hornet which was unveiled over a year ago at which time Hiller said its development beginning four years ago was for commercial as well as military sales. The Korean war interrupted Hiller's commercial program.

Extreme simplicity characterizes the Hornet, a pint-sized 'copter which has two hand-operated controls and no foot controls, and which completely eliminates the usual power transmission mechanism.

An idea of its revolutionary possibilities is gained from claims that the Hiller-Hornet can carry a useful load of more than 600 lbs., even though it weighs less than 360 lbs. empty. Tip-mounted ram-jet power plants developed by Hiller weigh only 12 lbs. each but develop 35 hp. each for a total of 70 hp. These motors have no moving parts and they may be removed in minutes with only a screwdriver. Fuel consumption is said to have been high but has been reduced, although the current figure was not released. Hiller says the machine is intended for medium-range work.

Several models of the Hiller-Hornet have been flying extensively in the factory test program, many auto-rotation landings being made from altitudes up to 3,000 ft. Numerous landings have also been made using only one engine. The factory says both engines have "never gone out at the same time" except when specifically cut off by the pilot.

During this test flying, possibilities for the little ram-jet's use in pilot training have appeared excellent. Many service pilots have soloed it after a minimum of instruction. ★ ★ ★

Some of the guests met us on horseback as the AG-14 landed at Eagle Rock Ranch.

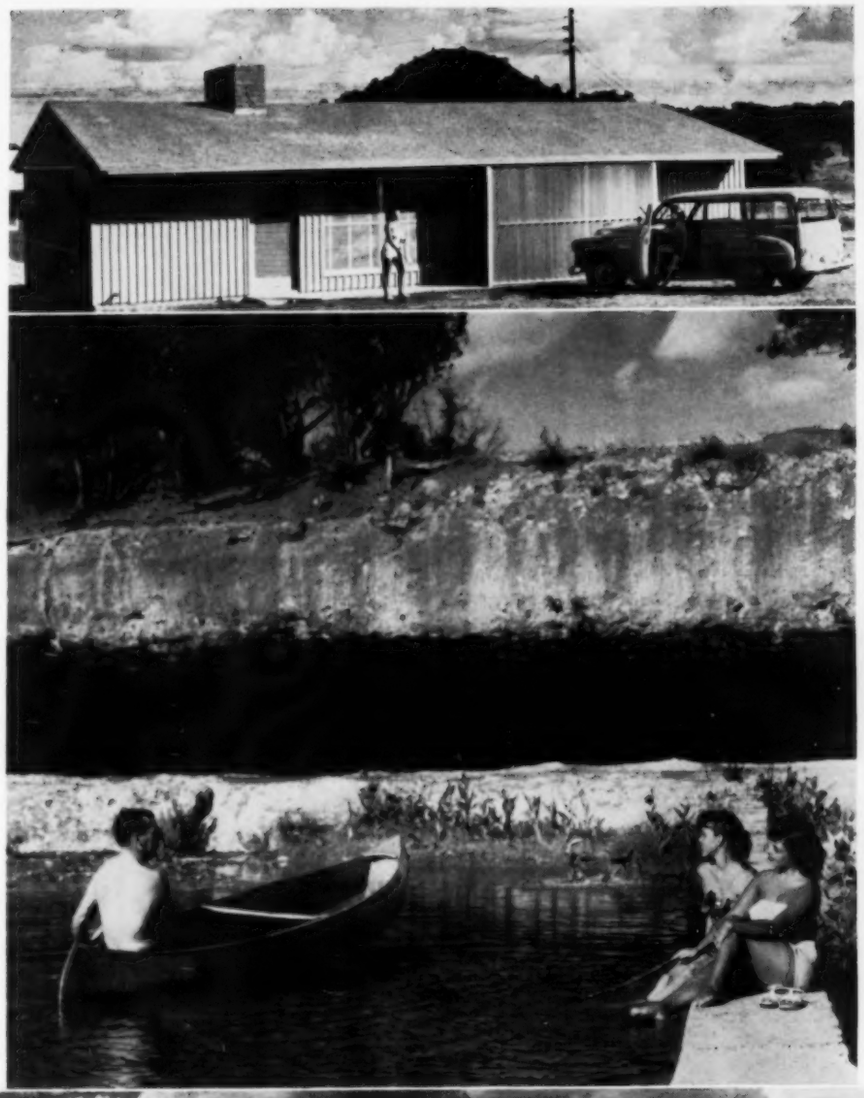
Guest Ranch For

By TOM ASHLEY

REMEMBER the pretty artist drawings we used to see devoted to the swell idea of real estate developments having their own air strips on the property? We went to Miami to see the only one which be-

At left is a close-up of 90-hp., 2-place pusher. Below is Eagle Rock Ranch's 2,600-ft., hard-surfaced air strip.
—(FLIGHT MAGAZINE Photos by E. H. Pickering.)

Homes like this one can be built or bought at Eagle Rock Ranch, with full use of its million-dollar facilities. Pilot Bob Soehner in the canoe enjoyed the sights along the ranch's fishing stream. That's Eagle Rock in the background, a huge overhanging slab of stone. Pool at bottom is heated in winter.
—(FLIGHT MAGAZINE Photos by E. H. Pickering.)

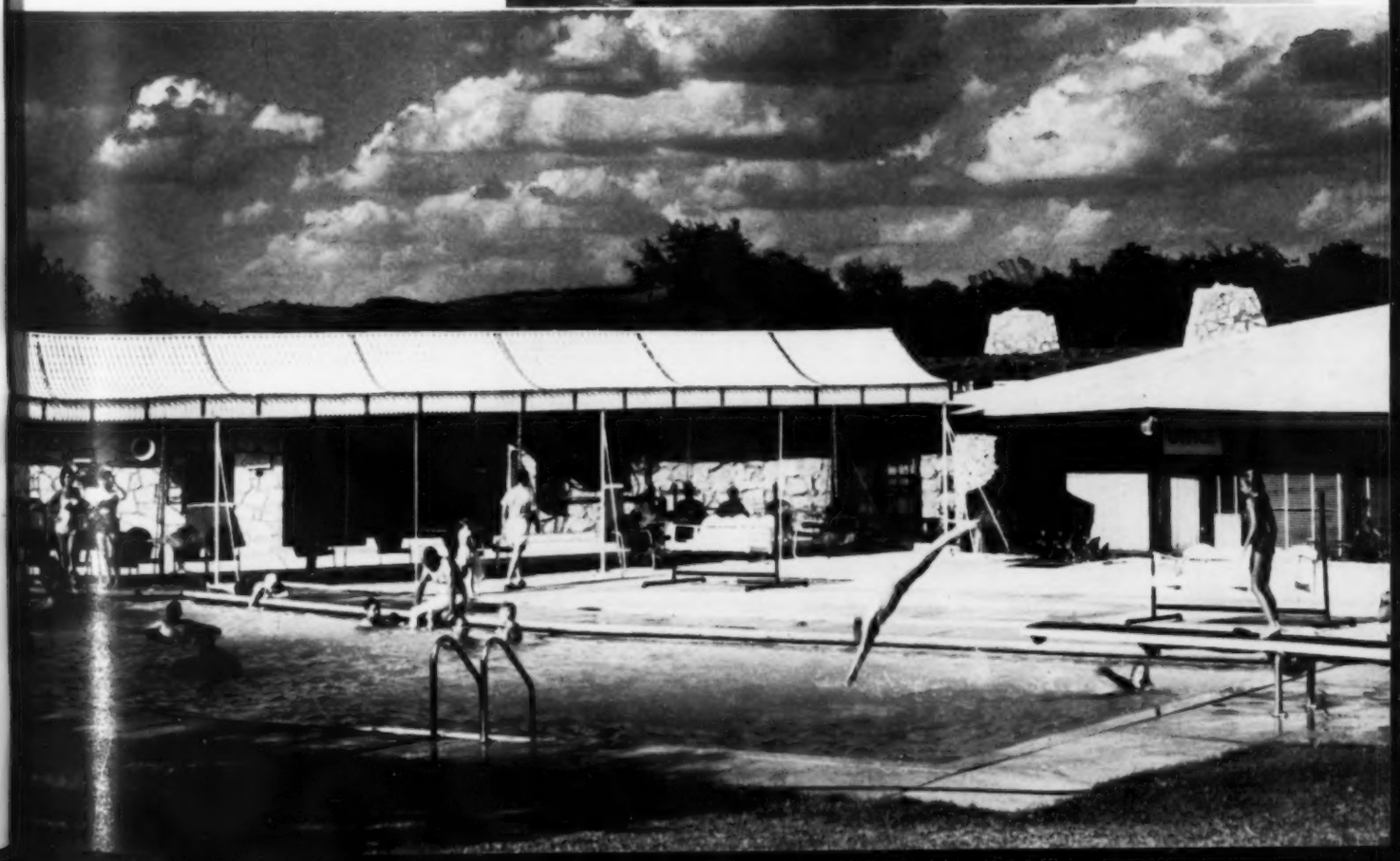


came a reality—it even had a canal sliced into it, so home owners could have a yacht at the back steps as well as an airplane in the garage. But the day we landed there the tax people raised the assessment so high that the landing strip along the boulevard had to be chopped up and sold as business property—it became too costly for support from air traffic.

We have now found something similar but a much more practical undertaking. It is 18 miles out ranch roads from the nearest busy highway. It has a million-dollar dude ranch recreational facility for plane owners to use as their very own alongside its 2,600-ft. hard-surfaced air strip. And lots can be bought for as little as $1,500 on which houses can be built costing from about $5,000 up with all

(Continued on page 35)

h For Airmen



Spontaneously and voluntarily, over 600 lightplanes gathered at the earthquake-ravaged town of Tehachapi, California, to render aid. Here are a few of them. They brought in 1,800 people—almost as many as Tehachapi's population of 2,000. First pilot to land there after the quake was Karl J. Thurber, captain of the Kern County Sheriff's Aero Squadron.

Emergency at Tehachapi Airport

One of many large cracks opened in the earth by the quake is shown here.

By CECIL C. MEADOWS
Superintendent of Airports, Kern County, California

I'VE been through earthquakes before. But on Monday, July 21, 1952, at 0455, when my bed leaped straight up in the air and came down with a bang, pandemonium broke loose and I got my family out fast—we were in falling range of a 5,000-gal. water tank on the airport at Bakersfield, my home.

Lights snapped off, explosions and flashes popped all over as hundreds of power transformers were shaken loose to fall. As I went into the administration building, another good shock hit and with United Airlines, CAA and Weather Bureau people we took off like a covey of quail. At daybreak I flew Sheriff Tom Kelly in our Bonanza to Tehachapi, once-beautiful little

mountain valley town of 2,000 but now a mass of ruins and center of greatest damage.

Little Tehachapi's landing field, which is under our supervision and is Kern County Airport No. 4, is only 900 ft. from the town's main street—it is really "close in." Landing, we walked into a picture of utter ruin as we entered the 3-block business section. Injured people were still in the ruins and when the last tally was made later, Tehachapi's earthquake toll was placed at 13 killed and 25 seriously injured.

How lives were saved and suffering was alleviated by rescue workers can never be adequately told, but at the top of the list in everybody's minds was the spontaneous and voluntary gathering of civilian lightplanes and military planes to render aid in the form of quick transportation, medicines, doctors and nurses, food, bedding, clothing and other disaster essentials. It was dramatic proof of the tremendous importance of civil aviation readiness, of the great value an airport offers to a community when all other forms of transportation are crippled.

Aviation people are good—on the scene, we noticed an Air Force Major arrive from Edwards Air Force Test Base, 30 miles to the east, in an AT-6. He asked who was in charge, was directed to Sheriff Tom Kelly, and told him his commanding officer had offered Tehachapi everything under his command if the people needed it. Sheriff Kelly asked for doctors, nurses, medicine, 20 MP's, a field kitchen with food, cots and bedding. Armed with this, the Major took off in a steep climbing turn. Bricks tumbled from wrecked walls under the beating of his propeller's low-pitch vibrations, but within an hour the C-47's from Edwards were landing right at Tehachapi's front door with aid—thanks to our modest little airport and an alert USAF air base commander who knew what to do in a hurry.

Almost simultaneously, pilots in private airplanes began arriving from everywhere—voluntarily. Nobody had mobilized these first arrivals. They just dropped in, and many of them brought doctors and nurses and offers to help in any way. We were literally snowed under with doctors and nurses. By noon many of them had nothing to do, they were so numerous. Private planes kept arriving. The important point here is that the main highway and only road and the railroad to Bakersfield were closed by the quake. But lightplanes kept pouring in, our contact with the outside.

By dark of the second night, we had 607 airplanes land. These were airplanes—not numbers of airplane movements. They had over 1,800 people aboard. This was almost as many as the town's population. By the end of the week, 1,000 planes had landed on our little field—all wanting to help and many of them contributing in a major way to the relief of a hard-struck and isolated little mountain town, the victim of sudden disaster. Our county is proud of its airport system. Disaster has proved that even little airports can handle lots of safe traffic if they have to. Tehachapi-Kern County Airport No. 4 undoubtedly had as many planes land there during this one week as during the 20 years of its existence. ★ ★ ★

The author (standing on wing) and Sheriff Tom Kelly of Kern County rushed from Bakersfield to Tehachapi in this Bonanza the morning of the disaster. The author is president of the American Association of Airport Executives.

People died in these ruins. Man sleeping in bed above hotel sign was thrown to pavement below by the quake, died later. Rescuers below are digging bodies from the ruins of a home.

The Shoulder Harness-Seat Belt Combination of the AG-1 Airplane

By FRED E. WEICK
Personal Aircraft Research Center
Texas Engineering Experiment Station
Texas A. & M. College System
College Station, Texas

IN the design of the Ag-1 experimental agricultural airplane* an attempt was made to provide every possible measure of safety for the pilot during operations required in dispersing materials close to the ground. Full use was made of the findings and cooperative aid of the Crash Injury Research Section of Cornell University Medical College. That agency's investigations over the past ten years show that human beings can ordinarily withstand low-speed airplane crashes without injury if adequate support and protection are provided (References 1 and 2). It is essential that the head not come in contact with any heavy structure or mass, such as projecting instruments, and in most airplane cockpits a shoulder harness is necessary in addition to a seat belt for suitable support in this regard.

Nearly all of the fatal accidents that have occurred in crop-control flying in this country during the past three years have been associated with either stalls or collisions with obstructions, usually electric wires or trees (Reference 3). In these accidents the nose of the airplane usually strikes the ground at approximately the minimum flying speed of the airplane. Because of the low speed at contact, this type of accident is definitely survivable. It follows, and it is now generally accepted, that a large proportion of the serious and fatal injuries associated with these crashes could be prevented by the use of a suitable shoulder harness in addition to the seat belt.

A novel arrangement combining the shoulder harness with the seat belt is used in the Ag-1 airplane. This arrangement has been found to be easily and quickly fastened, and it allows the pilot freedom of movement. It thus appears to overcome the main objections of duster pilots to the use of shoulder harness. It has been tried and apparently favorably accepted by over 640 pilots who have flown the Ag-1 airplane for the purpose of evaluating it. Because of the interest that has been shown in the combined shoulder harness and belt arrangement as used on the Ag-1 airplane, it is described in this report with the hope that it may help toward the more general use of shoulder harness.

*The airplane was designed and constructed at the Texas A. & M. Personal Aircraft Research Center in College Station, Texas. The work was (1) suggested by the National Flying Farmers Association and (2) conducted with financial and technical support of the Civil Aeronautics Administration. A number of manufacturers assisted by furnishing important parts.

Description of Harness

The basis of the Ag-1 installation was a standard Navy seat belt and shoulder harness* which is strong enough to support a 200-lb. man with an acceleration of 40g (or momentary load 40 times the man's weight, or 8,000 lbs.). It has been demonstrated that a man can withstand momentary accelerations of this order when properly supported (References 4 and 5). And since the indications from safety-belt failures are that accelerations of 15 to 25g are likely to be obtained in crashes of the kind under consideration, a harness capable of withstanding a 40g acceleration appears well warranted. Adequate support for the harness is, of course, necessary.

The harness as originally installed had the usual loop at the lower end of each shoulder strap which the pilot had to slip over a portion of the belt clasp before fastening the belt. Thus there were four loose ends, two for the shoulder straps and two for the belt, that had to be located and assembled before the harness could be fastened. This is a time-consuming operation and probably explains why many pilots, and particularly duster pilots who may get in and out of their airplanes every few minutes, do not bother to make use of a shoulder harness even when it is available.

*Military Specification B-5032 (Aer.) furnished by the Navy Department through the suggestion of Hugh De Haven of Crash Injury Research, Cornell University Medical College.

Simple Modification—The only final change made in the Ag-1 installation, after considerable experimentation, was the permanent attachment of each shoulder strap to its respective side of the seat belt as shown in Figure 1. Each attachment was made by means of a piece of ⅛-inch flexible steel cable, using a standard thimble in the eye at each end and lap-spliced by means of oval sleeves compressed with a hand-squeezing tool. The overall length was made as short as feasible. The attachment is shown in detail for the left-hand side in Figure 2, but any adequately strong arrangement could be used.

After the harness has been disengaged, it has been found convenient for a pilot to rest each side on a hook on the fuselage wall as shown in Figure 3. There are no loose ends to hunt for. On entering he merely sits down and slips each side on as shown in Figure 4. This is usually quicker and easier than locating and straightening out the ends of the ordinary seat belt alone. The single fastening of the belt is the only one that is made.

It was thought at first that this arrangement of harness and belt might require slightly more time to get out of following a crash, but the experience

Fig. 1—Navy 40g harness modified by permanent attachment of each shoulder strap to its side of seat belt.

Fig. 2—Attachment of shoulder strap to seat belt by means of flexible steel cable, lap-spliced by compressed sleeves.

with it to date under ordinary circumstances indicates that the difference in time would probably be negligible.

Inertia Reel—At the rear, the shoulder straps slide over a tubular support shown in Figure 3, and down to an inertia-locking reel* mounted on the rear wall of the cockpit as shown in Figure 5. The two shoulder straps are linked together by a whippletree and a single cable extends down to the inertia reel. The reel itself is provided with a light spring which tends to keep the cable wound up on it, and in the view shown in Figure 5 the cable is entirely wound up inside the case.

Under ordinary conditions the pilot can lean forward easily as shown in Figure 6. His freedom of movement is adequate for comfort and attendance

*The inertia reel (Part No. 0-3903) was donated by the manufacturer, the American Seating Company, Grand Rapids, Michigan.

Fig. 3—Harness resting on hooks while not in use, ready for pilot.

to ordinary cockpit duties.

If the airplane is given a deceleration of 3g or more, such as would occur in even a mild crash, the inertia reel locks the harness in the position it has at the start. It does this because the inertia of the reel itself, which is going forward with the airplane, causes it to continue forward against a light spring pressure and to engage with a ratchet which locks it in place. Thus the pilot's shoulders are restrained from going forward while the airplane is coming to a stop. As soon as it has come to a stop the freedom of movement will be available again if he should desire it.

If the pilot knows in advance that he may crash he can, if he desires, lock the shoulder harness in the rear position by moving a handle located on the left side of his seat (shown removed from the seat in the lower right hand corner of Figure 5).

Use of Modification Without Inertia Reel—The inertia reel has been found to be a great convenience, particularly for the duster pilot. The modification in which each shoulder strap is fastened permanently to its respective side of

Fig. 4—Pilot slipping on one side of harness.

the seat belt as shown in Figures 1 to 4 can, however, be used whether or not an inertia reel is incorporated.

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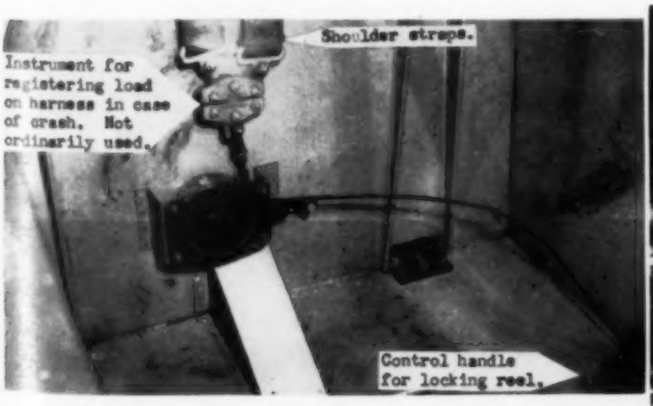
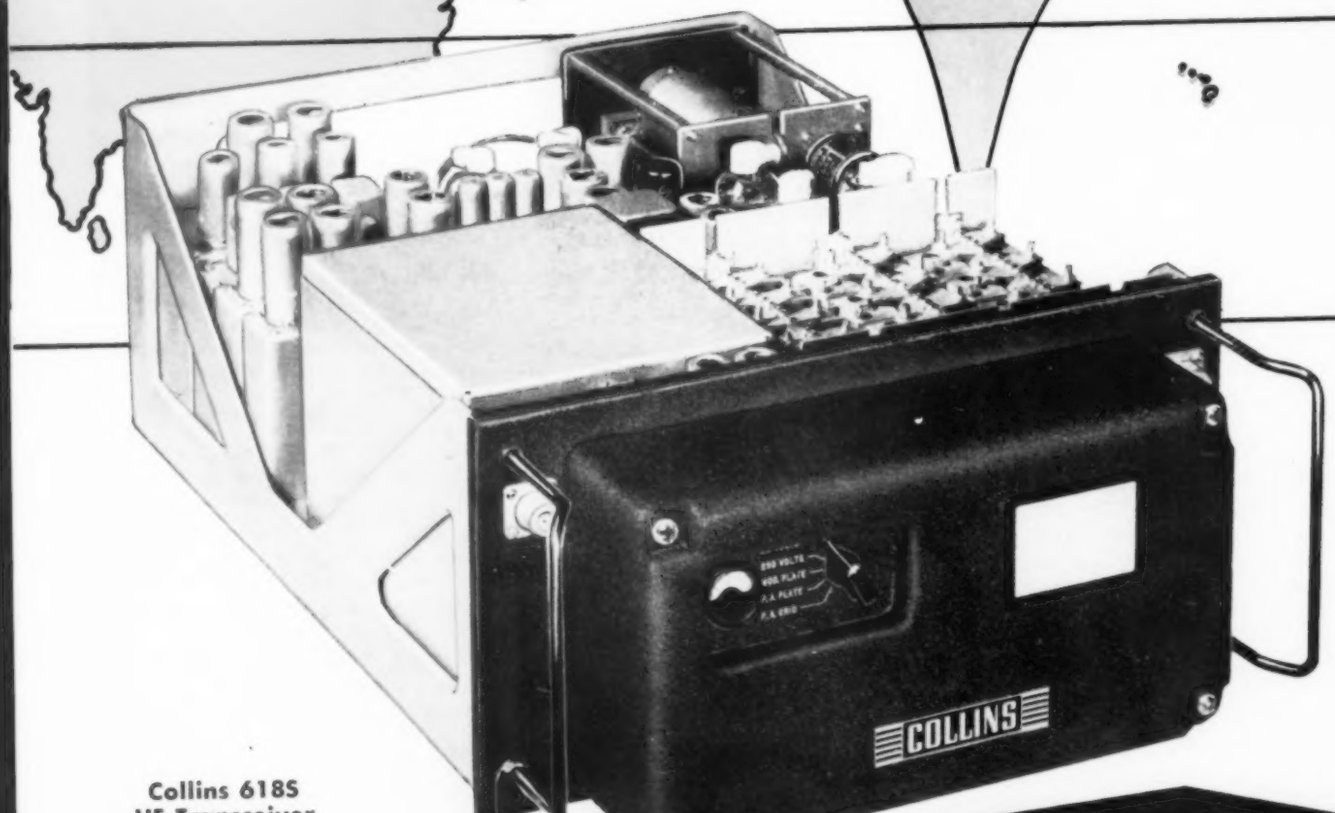

Shoulder straps.
Instrument for registering load on harness in case of crash. Not ordinarily used.
Control handle for locking reel.

Fig. 5—Inertia reel mounted on rear wall of cockpit (seat removed).

Fig. 6—Illustration of freedom of movement allowed by inertia reel.

a voice to be heard



Collins 618S
HF Transceiver

SPECIFICATIONS

SIZE: 1½ ATR TRANSCEIVER

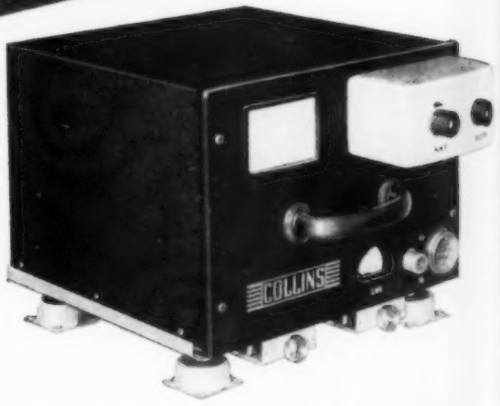
WEIGHT: Approximately 75 pounds, which includes both Transceiver and Power Supply

TUNING: Internal circuits automatically tuned after insertion of crystal

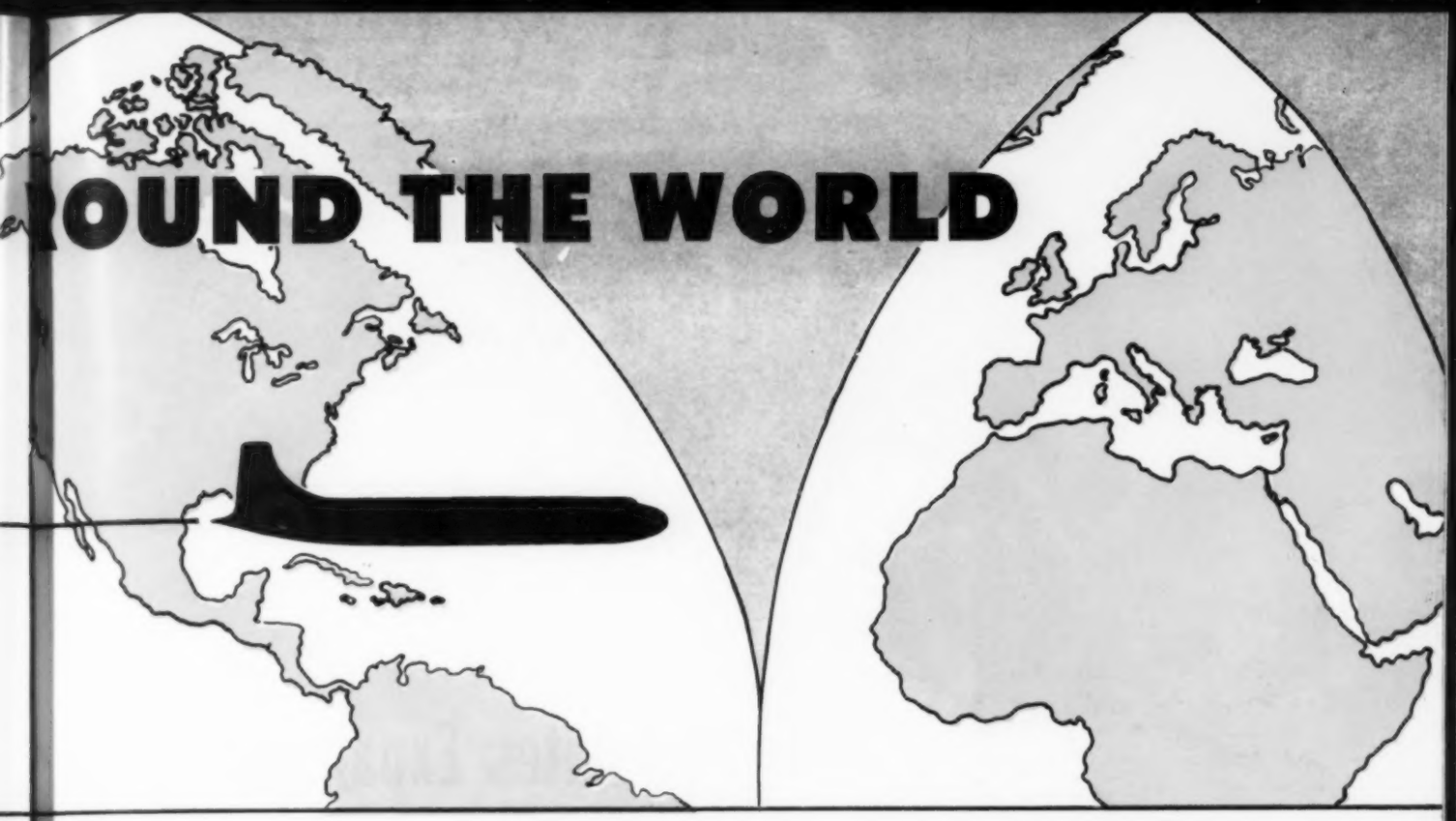
POWER OUTPUT: 100 watts phone and CW

INPUT VOLTAGE: 28 volts DC and 400 cycle, 115 volts AC

First airborne Transceiver to use mechanical filters.



Collins 180L-2 Antenna Tuning Unit
(Also used with Collins ART-13 and 18S)



NEW... Collins 618S 144 Channel HF Transceiver

Up To 144 Channels – 2 to 25 megacycles

100 Watt Power

Automatic Operation

Collins Radio Company takes pride in announcing the 618S HF Transceiver as a long awaited successor for overseas operations to the Collins 18S transceiver now being used everywhere in the air. The 618S is designed primarily to meet the requirements of the many commercial airlines engaged in interchange agreements and international operations. Its 100 watt power is proven completely adequate for domestic and overseas operations.

The 180L-2 antenna tuning unit matches the output of the 618S to standard aircraft antennas and *guarantees* peak performance on ALL frequencies under ALL operating conditions. Another advanced design feature is the use of the Collins mechanical filter in the IF circuit which provides maximum adjacent channel rejection.

Every engineering effort has been directed toward insuring the utmost in dependability, ease of maintenance, and the elimination of ground adjustments formerly necessary to implement a frequency. No coil changing — no tune-up required — modular type construction is used, and the units are plug-in type for ease of servicing and maintenance.

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For Engineering Excellence in Airborne Communications, it's . . .

COLLINS

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

11 W. 42nd St., NEW YORK 36 | 1930 Carpenter Blvd., DALLAS 2 | 2700 W. Olive Ave., BURBANK

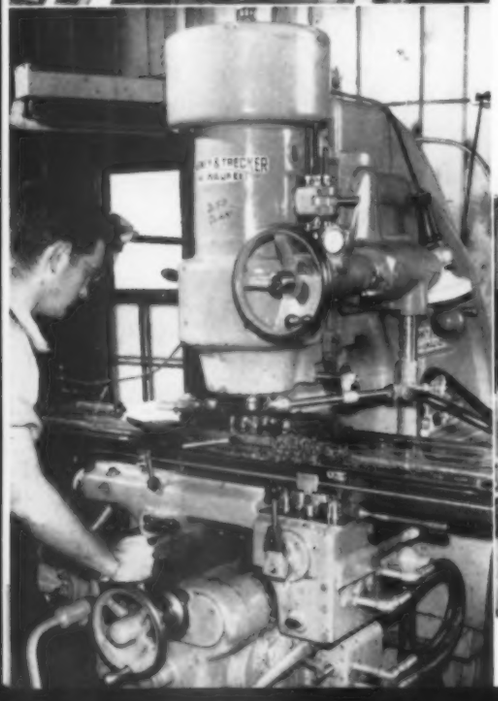
Don de Lackner (seated at left) heads Aeroaffiliates. With him is Frank Koenig, vice president. Part of one corner of its machine shop is shown above, turning out Chance Vought parts.
—(FLIGHT MAGAZINE Photos by Tom W. Collins.)

Aeroaffiliates Expansion

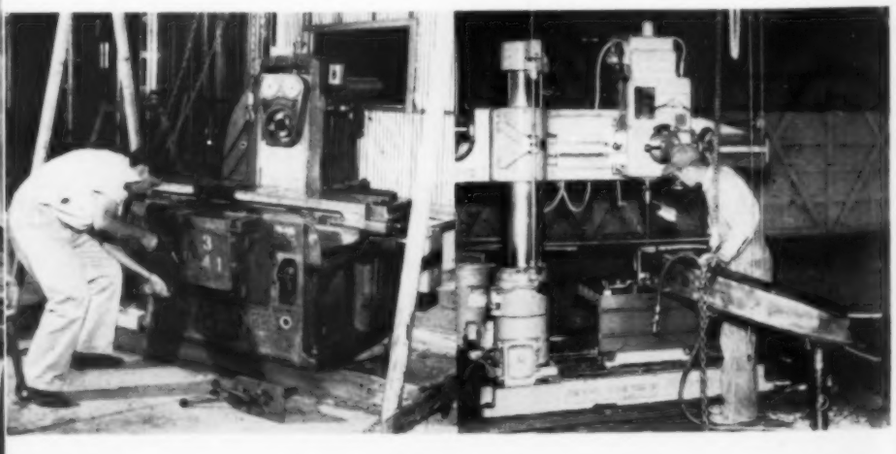
A SPECIALIZED facility serving the aircraft industry in Texas and nearby states, Aeroaffiliates at Hicks Field in Ft. Worth has tripled its working floor space to 44,000 sq. ft. for installation of many new machine tools of its own and from the U. S. Air Force. The firm specializes in machined parts, tools, dies, jigs and fixtures, with a research and development department for the Air Force and its suppliers.

Gear work to aircraft standards makes Aeroaffiliates unique among subcontracting facilities in the Southwest. It is now producing gear blanks and is putting in a complete gear cutting, heat treat, hard chrome and general plating, and gear grinding shop. Machined parts are being produced for 8 major concerns—Bell Aircraft, Cessna, Chance Vought, Chrysler, Convair, General Motors, Temco and Texas Instruments. Two 10-hr. shifts are worked.

Donald de Lackner heads Aeroaffiliates, which was moved to Ft. Worth in 1949 from Tuckahoe, N. Y. He has been in aviation 25 years, starting as a mechanic at Sikorsky. He obtained an aeronautical engineering degree in 1930. Among other achievements, he gained prominence in design with the Granville Brothers for his work on the famous pre-war Gee Bee racers. He is still interested in aero design activities and has a twin-rotor helicopter project. ★ ★ ★



Aeroaffiliates craftsmen are shown at left and below in production on critical items for aircraft manufacturers. At center below is Walt Oosterveen, shop foreman, on a tool rebuilding job.
—(FLIGHT MAGAZINE Photos by Tom W. Collins.)



PICK ANY AVIATION NEED from 1 to 8

1 LINE SERVICE
You will appreciate the prompt attention our line personnel gives you as well as the many extra services and accommodations we offer.

2 100-HOUR CHECKS
The J. D. Reed Company is geared for complete 100-hour checks when your aircraft is idle between flights.

3 MAJOR OVERHAULS
Our factory trained staff, using the finest and most complete equipment will put your aircraft in like new condition.

4 PROPELLER SERVICE
When your needs warrant propeller service you will find the J. D. Reed Company ready to give you immediate service.

5 ENGINE SERVICE
You will always find expert workmanship and technical knowledge available for service on all types of engines.

6 PARTS and ACCESSORIES
A complete stock of parts and accessories is maintained for your needs at all times eliminating unnecessary delays.

7 CUSTOM RADIO INSTALLATIONS
For years the J. D. Reed Company has specialized in designing the type radio installation that will provide the best results under all conditions.

8 EXECUTIVE CONVERSIONS
Reed custom executive conversions offer the ultimate in beauty and transportation providing maximum utility at the most reasonable initial cost.

You Can't Go Wrong When You Depend on

J. D. REED CO. Inc.

SALES SERVICE Beechcraft

DISTRIBUTOR

MUNICIPAL AIRPORT
HOUSTON, TEXAS

for the Solution of Your Problems

Certified Beechcraft Service

To obtain the best service for your Beechcraft and for prompt attention to maintenance and overhaul requirements, visit the Certified Beechcraft Service Stations listed.

Here every tool, every facility and every service was developed with your Beechcraft in mind.

Methods can be copied — but nothing equals your confidence in the real thing — CERTIFIED BEECHCRAFT SERVICE.

And you'll find intelligent, courteous assistance in filling your needs — the kind of attention you have a right to expect.

Aircraftsmen, Inc.
Will Rogers Field
Oklahoma City, Oklahoma

Alamo Aviation, Inc.
Municipal Airport
San Antonio, Texas

Anderson Air Activities
General Mitchell Field
Milwaukee, Wisc.
Truax Field
Madison, Wisc.

Atlantic Aviation Service
New Castle County Airport
Wilmington, Delaware

Atlantic Aviation Corp.
Teterboro Airport
(25 minutes from Times Square)
Teterboro, New Jersey
also
Logan Airport
East Boston, Mass.

Butler Co., Aviation Division
Municipal Airport
Chicago, Ill.

Currey Sanders Aircraft Co., Inc.
Downtown Municipal Airport
Shreveport, La.

Francis Aviation
Capitol City Airport
Lansing, Michigan

Gray Aircraft Svc. Co., Inc.
D. A. Cody, Service Mgr.
Love Field, Dallas, Texas

Harte Flying Service
Municipal Airport
Wichita, Kansas

Hunter Flying Service, Inc.
Hunter Field
Cedar Rapids, Iowa

Ohio Aviation Company
Dayton Municipal Airport
Vandalia, Ohio

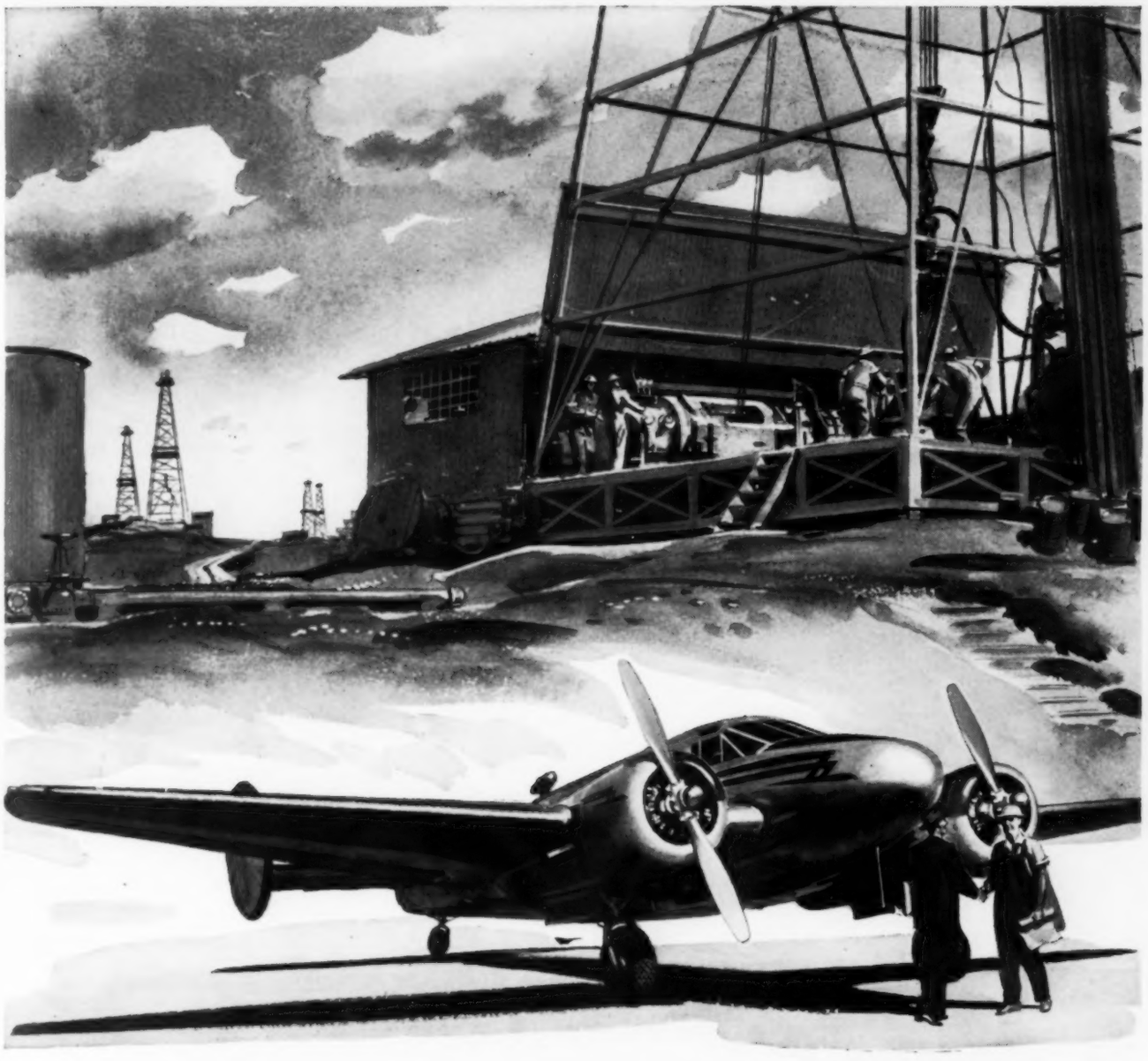
J. D. Reed Co., Inc.
Municipal Airport
Houston, Texas

Roscoe Turner Aeronautical Corp.
Municipal Airport
Indianapolis, Ind.

Tradewind Airport Corp.
Tradewind Airport
Amarillo, Texas

Tulsair Distributors, Inc.
Hangar 5, Municipal Airport
Tulsa, Oklahoma

Wings, Incorporated
Wings Field
Ambler, Pennsylvania
Philadelphia International Airport
Philadelphia, Pennsylvania

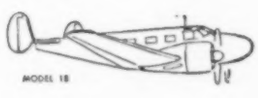


HELPING AMERICA BUILD FASTER

Oil* and Beechcrafts make a profitable mixture!

Company-owned Beechcrafts slice travel time as much as 75% for key executives in over 200 companies in the petroleum industry. This twin-engine Beechcraft Executive Transport cruises at 200 miles per hour — puts oil fields right next to home offices.

***Beechcraft serves 'em all!** In every field of industrial activity, Beechcrafts are helping America build faster . . . helping America do the *double* job of increasing defense production and keeping consumer goods rolling, too. Learn how a Beechcraft can serve *your* business *profitably*. Call your Beechcraft distributor. Or write Beech Aircraft Corporation, Wichita, Kansas, U. S. A.



Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

ALL-ROCKET LOCKHEED F-94C STARFIRE carries 24 rockets of 2.75-in. size in its nose, with "brain-like" instruments spotting enemy aircraft, locking onto the target, tracking, aiming and even opening fire when in range.
—(Lockheed Aircraft Photo.)

NEWEST BEECHCRAFT DISTRIBUTOR is C & H Air Service at Wichita, Kansas, temporarily based at Sunflower Airport but to be headquartered at the new Municipal Airport when it is completed. Dean Case of the firm is shown (center) with Beech Sales Manager Leddy Greever and Beech President O. A. Beech.
—(Beech Aircraft Photo.)

AIR REPORT

(Continued from page 7)

of the latest deliveries was to go to Sperry Gyroscope Corp.

NAVY CONTRACT WITH CESSNA HELICOPTER DIVISION has been signed for design studies, experimental construction and flight-testing in a long-range research program, according to Sherman Graves, Cessna Helicopter Division manager. Charles M. Seibel, chief engineer, will be in charge. An expanded engineering staff will be needed.

PERFORMANCE WISE, THE 19TH NATIONAL SOARING CONTEST sponsored by the Soaring Society of America at Grand Prairie, Texas, during the last two weeks of August far exceeded any previous national contest. The 25 contestants broke 10 records; made 13 flights in excess of 300 miles, 5 of which were goal flights; made 42 out-and-return goal flights for 5,000 miles total distance; made 14 flights in excess of 200 miles; in 10 contest days the 25 pilots logged 26,066 miles flown. Longest flight of the meet was turned in by Dick Johnson, national champion, for 373 miles.

PRATT & WHITNEY IS DEVELOPING AND BUILDING RAM-JET ENGINES IN A NAVY PROJECT for high-speed guided missiles.

PHASING-OUT OF B-36 PRODUCTION BY CONVAIR AT FORT WORTH in 1954 will be followed by "other essential work" in the giant factory, according to official statements. USAF preference for the Boeing B-52 over the Convair B-60 as a successor to the B-36 led to the phasing-out plan.

SMALL AIRPORTS AND PRIVATE FLYING WERE OVERLOOKED BY THE PRESIDENT'S AIRPORT COMMISSION which recently investigated airport noise and safety problems, and the Commission's recommendations include implications which, if literally accepted, would handicap small airports and private flying. So says the Utility Airplane Council of the Aircraft Industries Association.

CAA REGIONS ARE INVITING REACTION OF PILOTS TO PLANS FOR DECOMMISSIONING 296 OF THE 374 LOW-FREQUENCY RADIO RANGES, sending news announcements to local newspapers in the cities affected. Seventy-eight of the stations will be retained permanently and will be so spaced to provide blanket coverage for weather broadcasts on the low-frequency band and to provide a basic low-frequency navigation system. Pilots are urged to send their comment to their respective regional CAA administrators.

ALL-METAL DE-ICER BOOT has been engineered by Lockheed and is shown after flight-test on F-94 Starfire, with Flight Test Engineer F. E. Gaiser at left and Test Pilot Sammy Mason at right. Rivetless, boot is made of a silver-copper-plastic sandwich bonded to aluminum base. Normal electrical load is 40 watts, applied for 2 seconds at 1.5-min. intervals, maximum is 75 watts per sq. in.
—(Lockheed Aircraft Photo.)

NAVY MID-AIR REFUELING OF FIGHTER PLANES is being conducted with carrier-based North American AJ-1 Savage attack planes as aerial tankers, using a British-developed probe and drogue method wherein the fighter pilot steers his plane into a funnel device extended on a flexible hose from the tanker.

U. S. TRUNK AIRLINES CARRIED OVER 2,000,000 PASSENGERS IN JUNE, flying over 1 billion revenue passenger miles in a single month. Both are new records, says the Air Transport Association.

OUTLOOK FOR JET AIRLINERS IN AMERICA is summed up by C. R. Smith, American Airlines, as follows: Some jet transports may operate on domestic routes, probably long transcontinental schedules at first, in about 1958. Meanwhile, Douglas DC-7 and Lockheed's newer Constellation will be interim types, 25 DC-7's being delivered beginning a year from now to AA. At 360 mph., these will probably be the last of AA's large transports with piston engines. Lockheed, Douglas and Boeing are studying jet airliner specifications in close work with the airlines themselves, but no manufacturer in the U. S. is now prepared to offer a model for sale and no airline has present intention of placing an order for jet transports. "The basic problem is that no one has yet been able to build a jet transport which will operate with a profit," Smith says. The nut of the profit and loss problem is that true jets use far more fuel—the DC-6B consumes 8.9 lbs. of fuel per mile while a true jet of about the same size, in spite of its much higher speed, will require about 20.4 lbs. of fuel per mile.

ROBINSON AIRLINES, a local service carrier in New York state, has changed its name to "Mohawk Airlines," after the Mohawk Valley which it serves.

ROUND-TRIP ATLANTIC CROSS-

(Continued on page 38)

Corsairs Join the French Navy

Glistening new Corsairs wearing the anchor and tri-color insignia of the French Navy are rolling off production lines at Chance Vought Aircraft in Dallas, Texas. They are F4U-7 Corsairs, now being built in quantity for the French Government under the Mutual Defense Assistance Program.

France is getting America's number one piston engined fighter-bomber in the F4U-7. It is similar to the F4U-4 Corsair, but, like the AU-1 Corsair currently in production for the U. S. Marine Corps, carries heavier armor and armament. Other Corsair models have flown thousands of vital missions in Korea.

Chance Vought Aircraft. DALLAS, TEXAS

ONE OF THE FOUR DIVISIONS OF UNITED AIRCRAFT CORPORATION

Leadership demands constant achievement

20 Distinguished World Airlines

—and the U. S. Air Force and U. S. Navy - have selected

THE CONSTELLATION & SUPER CONSTELLATION

On every continent of the world leading airlines fly the famous Constellation. Today more people fly over more oceans and continents on the Constellations of these great airlines than on *any other modern airplane.* It is also the leader on the most traveled route, the North Atlantic. This successful operation by international airlines established the Constellation's record for dependable performance—leading to the development of the new Super Constellation, today's finest transport airplane. No other modern airliner has been reordered so often. Whenever you travel, insist on the dependable Constellation service of these airline leaders.* If there is no local office in your city, see your travel agent.

LOCKHEED* *Listed above on travel posters.*

AIRCRAFT CORPORATION · BURBANK, CALIFORNIA, AND MARIETTA, GEORGIA

Look to Lockheed for Leadership

Lockheed

SUPER CONSTELLATIONS MAKE MONEY FOR AIRLINES

KLM Royal Dutch Airlines have just placed their *third* successive order for Super Constellations. Here is powerful indication of a famous airline's opinion of this larger, more luxurious successor to the experienced Constellation. KLM plans to put their Super Constellations into service on the heavily competitive North Atlantic route, where long range and superior performance are paramount.

Announced simultaneously was a new order for Super Constellations placed by Linea Aeropostal Venezolana. LAV also made their selection after careful consideration of the finest competitive equipment. This choice is backed by their long previous experience with dependable Constellations.

Why have a total of 12 world airlines ordered Super Constellations, bringing Lockheed's Constellation production line to the greatest peak in its continuous 8 year history?

The answer is very simple—*it's because this great airplane has been proved to make money.*

RECORD REORDERS

Here are some of the basic reasons why the Constellation has been reordered more often than any other modern airliner:

1. It offers longer life and therefore greater profit on the investment—because it is designed to grow further. (The Super Constellation now flies 133,000 pounds at 350 m.p.h., and when more powerful engines are available it will carry 150,000 pounds at 425 m.p.h.).

2. The Super Constellation is versatile and can be easily changed in a few hours to carry as many as 94 passengers. Thus it can be used for many purposes on many routes to meet changing competitive conditions.

3. Airlines like its low operating cost. It is practical and reliable, and it makes money.

4. It has longer range than any other commercial airplane.

5. It can match in speed the competitive schedules of any airliner.

6. Operators like it because travelers like it—for dependability, luxury and speed.

Thus the Constellation and now the Super Constellation are currently playing a vital role in profitable airline operation, at the same time giving assurance of future profit because of the built-in "growth factor" not found in any other airplane.

GUEST RANCH FOR AIRMEN

(Continued from page 21)

conveniences. Or, if you aren't interested in an investment, it has air-conditioned accommodations for casual visitors by air—you and your friends or family can fly in for a day, a week or a month or so; it is open the year-round. The place: Eagle Rock Ranch. The location, Wimberly, Texas, in the Texas Hill Country, about 33 miles from Austin and 40 miles from San Antonio, right on the airway between the two cities.

Our visit to Eagle Rock was all the more interesting because we had opportunity to make the hop in the Anderson-Greenwood AG-14, certificated by CAA in 1950 as the newest all-metal 2-place in recent years. The Korean war halted marketing plans of the Anderson-Greenwood Co., of Houston, which developed the design, and the 90-hp. pusher with nose wheel and twin tail booms is now being evaluated by the CAA's Aeronautical Training Center in Oklahoma City.

Pilot Bob Soehner of the Aeronautical Center had a cross-country scheduled in this program, and picked us up to go along, our stop at Eagle Rock being right on the course. It gave us a good opportunity to get a closer look at the radical pusher design described in detail in this magazine on several past occasions. Engine-cooling and propeller-shafting problems have been solved by the pusher, allowing the design of a beautiful and very roomy cabin forward of the wing leading edge for outstanding visibility. Low-to-the-ground cabin entry is another advantage.

The AG-14's empty weight is 861 lbs. and gross weight is 1,400 lbs., including 23 gals. of fuel. Good 105-mph. cross-country performance is found with its 90-hp. Continental engine. At 7,000 ft., for example, we were indicating 95 mph. at 2,300 rpm. with an outside temperature of 62 degrees. Leaning the mixture at this altitude, we averaged a hair over 5 gals. per hour, or about 20 miles to the gallon or so.

We had hoped to meet Ed James, Houston industrialist who has made Eagle Rock Ranch an outstanding Hill Country resort. But he has a new de Havilland Dove and distant business trips are becoming frequent for him—

Air Commuter Works in City, Lives on Ranch

The pilot in the scene above is a flying business man on his way to work—in his Cessna 140 airplane. His office is 75 miles away by highway, but only 40 miles by airway, and he commutes by air in less time than it formerly required when he lived in town and went back and forth by auto. He is usually in his office by 8:30 a. m. D. D. Sanders, business machine distributor for a large Texas territory around San Antonio, is the pilot in the picture.

Sanders has a modest home in a real estate development at Eagle Rock Ranch, which has a 2,600-ft. hard-surfaced air strip for its residents and guests. Besides use of the strip, he and his family have access to the Ranch's million-dollar guest facilities including horseback riding; swimming pools, stocked fishing stream; hunting; golf course; tennis courts and club house.

He averages 385 hours of flying per year, mostly in covering his territory but including two trips to Cleveland and one to the West Coast. Sanders has been flying for 24 years and says his Cessna 140, with a jump seat for the child, carries him and his family wherever they want to go at 100 mph. for about a nickel per mile. He keeps a station wagon at Eagle Rock Ranch and a car at the airport in San Antonio; at other stops he uses Hertz System rental autos. ★ ★ ★

Economy!

Talk about enthusiasm, talk to a Piper Pacer owner! He has good reason to rave. He has a comfortable airplane for four people. He has range and climb and a solid ship that takes the jolt out of rough air. Yes, he's getting performance, and he's getting it with economy. That's why he's enthusiastic.

No other plane owner gets four-place transportation as inexpensively as the Pacer owner. The lower initial cost means less hourly depreciation. The lower horsepower needed by Piper's compact, efficient design means less gas consumption. The new Piper Duraclad finish and service-proven features of Piper planes means lower plane maintenance.

Yes, the Pacer matches performance and utility with economy. A happy combination which makes happy owners.

Ask one of the firms listed to demonstrate how one of the Piper models can save you valuable time and money. These firms are prepared to serve all your aircraft requirements.

Arizona
ANDERSON AVIATION COMPANY, INC.
Sky Harbor Airport
Phoenix

Louisiana-Mississippi
LOUISIANA AIRCRAFT
Municipal Airport
Baton Rouge, La.

Oklahoma
SMYER AIRCRAFT SALES & SERVICE
Municipal Airport
Ponca City

Texas
BROWN FLYING SERVICE
Municipal Airport
San Antonio

PARKER-HUETT AVIATION COMPANY
White Rock Airport
Dallas

SOUTHWEST AIR RANGERS
Municipal Airport
El Paso, Texas

WICHITA FALLS AIR TRANSPORT COMPANY
Municipal Airport
Wichita Falls

he and the Dove were in Chicago about to leave for Cuba when we arrived.

Eagle Rock Ranch was just as he had pictured it to us—guests were all over, catching fish in the well-stocked stream, which is fed by springs; swimming in two special pools, one in the stream beneath a huge rock which forms a cavern and the other on the lawn of the big guest house; boating; riding horses; playing golf and tennis; and just relaxing in general around the pools or in the big air-conditioned lounges and play rooms. All activities go with guest registration and with cottage ownership at the ranch. We enjoyed excellent ranch meals including fine steaks, and Chef Sammy Sansom even has a soda bar for children, Eagle Rock Ranch being a family resort above all else.

Some of the guests commute to Texas cities while spending a season there. Others can make their year-'round homes there. Because of its air strip, it offers much to pilots and aircraft owners wherever they may be.

★ ★ ★

JUST AMONG OURSELVES

(Continued from page 13)

and alphabetical coordinates to find a specific town. Right now there is some argument as to where the towns will be listed—on the front margins of the charts or on the backside. Airmen insist they should be on the front. C & G don't want to use the margins and want to list all towns on each chart on the back.

This new application of an old and worthy system is certainly a step forward, especially for the average itinerant pilot. All we need now is more force, effort and interest behind a national airmarking campaign. We were especially happy to learn recently that the 99's, international organization of licensed women pilots, intend to "not rest until every community in the U. S. is properly and duly marked for the airplane pilot as is the highway today for the motorist."

It's high time the entire industry, especially state aviation officials and private flying groups, get behind the 99's and their national airmarking campaign. The 99's hope to get an airmarker at least every thirty miles is well within the realm of possibility in a mighty short span of months if the private flying fraternity and government aviation officials get in behind the campaign. There's been nothing but apathy and pure indolence in the airmarking field during the postwar years. It's encouraging to note that the gals are behind it. That improves the chances that something will be done.

★ ★ ★

"The TRI-PACER is the Best Plane I Could Have Selected"

Says Robert O. Kahse
Regional Sales Manager
L. G. Balfour Co.
Sacramento, California

Western Balfour Company
A division of L. G. Balfour Company

ROBERT O. KAHSE
SALES REPRESENTATIVE
2400 WULFF LANE
SACRAMENTO 15, CALIFORNIA

July 24, 1952

Mr. William T. Piper, President
Piper Aircraft Corporation
Lock Haven, Pennsylvania

Dear Mr. Piper:

Since we've flown our Piper Tri-Pacer over 60,000 miles in a year's time, I thought you might be interested in hearing how well an airplane has fitted into our business.

As of January 12th, 1951 I had never taken a flying lesson, and had never been in a small plane. On January 13th I started flying lessons thinking that I could use a rented plane to a minor extent in the course of my travels. While learning - I was amazed to realize what a plane could do for me. Before completing my course I had purchased a Piper Tri-Pacer.

How well did we make a choice of a plane? In less than 12 months we have flown over 500 hours, at a cost of less than $3.75 per hour - a figure which includes all fuel, tie-downs, insurance, and repairs. It does not include depreciation. I estimate my speed over the ground as 125 miles per hour, and that figures out to less than .03¢ per mile.

My territory amounts to more than 160,000 square miles - from the Los Angeles County line north to the Oregon border, and the western half of Nevada. The plane has enabled me to cover that area far cheaper than I could have done so by car, it has let me be home most every night during my selling season, and has provided my customers with much better service than I had ever provided, and by far better than my competitors have given. This together with the additional prestige has resulted in more business at a greater profit with more time home.

That is what the plane has done for me, but the selection of the plane itself has been as important because the Tri-Pacer has - in the year we have been flying - been outstandingly the best I could have selected for the job. A lot of the airports are located in mountain canyons, with turbulent air and cross winds of 30 to 50 miles or more. With the tricycle gear I have no worries about getting on the runway.

At the end of my first year flying I can look back and see just how well suited the Tri-Pacer has been for my work - inexpensive transportation, ability to handle all landing and take-off situations, ease of maintenance and flying, and the making of my daily traveling more pleasant and my time at home more frequent.

Sincerely yours

Regional Sales Manager
L. G. Balfour Co.
Taylor Publishing Co.

ROK:AIG

"more business at a greater profit with more time home"

You, too, will prefer the Tri-Pacer with its modern tricycle gear, exclusive interconnected controls, and longer-lasting Duraclad finish. Now with 135 horsepower; cruises better than 130 mph. at altitude. Costs thousands of dollars less than any other 4-place plane. For information on all Piper planes write Dept. 9-F.

PIPER AIRCRAFT CORPORATION

Lock Haven, Pennsylvania

LOCATION OF 38 DE HAVILLAND DOVE EXECUTIVE TRANSPORTS IN AMERICA is plotted on this map by Riley Aircraft, which sold 31 of them. Most are concentrated in the Southwest. All deliveries are flown across the North Atlantic.
—(Riley Aircraft Map.)

AIR REPORT

(Continued from page 32)

ING IN SINGLE DAY was accomplished on Aug. 26 for the first time, an English Electric Canberra twin-jet bomber making the circuit in an elapsed time of 10 hrs., 3 mins., 28.28 secs. The East-West trip of 4 hrs., 19 mins. was shortened to 3 hrs., 25 mins., 18.13 secs. on the return flight, after refueling at Gander, Newfoundland. Jet-stream winds of 100 mph. were reported during the feat.

FIRST ATLANTIC CROSSING BY HELICOPTERS was accomplished last month when two Wasp-powered Sikorsky H-19 helicopters of the Military Air Transport Service landed at Weisbaden, Germany, on Aug. 4. They were flown 3,800 miles from Westover Air Force Base, Mass., in 50 hrs. of flight time covering 21 days. Longest hop was 770 miles between Labrador and Greenland.

TWO ADDITIONAL PIPER TWIN-STINSONS ARE NOW BEING COMPLETED, one to be used for static tests and the other for flight testing. A newly-designed Hartsell constant-speed propeller will be used on the Piper-Stinson's Lycomings for a cruising speed of 150 mph. or better at altitude.

WORLD'S TINIEST AIRPLANE, the "Sky Baby," was designed by Ray Stits (left) and recently flight-tested by Robert Starr (right), both with Pacific Airmotive at Burbank. Span is only 7 ft. 2 ins., length 9 ft. 10 ins., weight 452 lbs. An 85-hp. Continental engine turns a 60-in. propeller. Stits claims 200-mph. performance for it.
—(Pacific Airmotive Photo.)

INCREASING SALES FOR ITS NEW PORTABLE VHF TRANSMITTER-RECEIVER are reported by Mitchell Industries of Mineral Wells, Texas. It is completely VHF and portable and is operated on dry cell batteries. Some executive pilots say it is the answer to their problem of an auxiliary radio for multi-engine transports. It is also ideal as a low-cost radio transmitter and receiver for lightplanes without electrical systems.

CIVIL AIR PATROL'S 1952 International Cadet Exchange Program carried 110 American CAP Cadets

HIGH-ALTITUDE FLIGHT PARTY OF TEXAS PRIVATE FLIERS ASSOCIATION recently attracted 20 planes and 50 persons to Eagle Nest, New Mexico, where two air strips, each 8,000 ft. long, are located at 8,500-ft. elevation. Bob LeSage of Dallas, who improved the strips, was host to the party at his nearby Moreno Ranch, with fishing, horse racing, and a barbecue for entertainment.
—(Photos by House of Photography, Raton, N. M.)

NEW MULE FOR THE ARMY is this Piasecki H-25 helicopter in production at Morton, Pa. It can carry four to six men in addition to crew of two, and will be used for evacuation, assault and transport operations.
—(Piasecki Photo.)

What every pilot should know about MICRONS

(Psst! What you don't know <u>can</u> hurt you!)

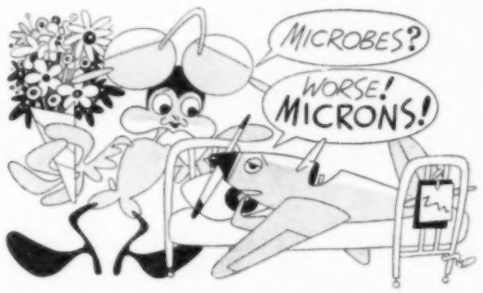
"And what," you ask, "is a *micron*?"

Answer: "Micron" has *two* definitions, and you'll want to know them both—the first to impress your friends, the second to keep out of trouble. Here they are:

1—A micron is a *measurement of length*. Just remember that 25,400 microns equal one inch . . . and then take it from there. From now on, in your hangar-flying sessions, don't just say "mile" when you can say "1,609,344,000 microns." The boys will be amazed.

2—A micron, chemically speaking, is a particle having a diameter of .000039 inch. Engine manufacturers warn that particles larger than 10 microns in diameter can be injurious to your engine. Four particles of this 10-micron size would have to get together before you could even see them with your naked eye, even if your latest CAA physical shows that you have 20-20 vision.

But when these invisible particles get into your engine—watch out! They can cause damage or undue wear. They could even cause engine failure and a forced landing.



How do they get in?

They get into your engine with the gasoline—regardless of the brand you use. No matter how carefully it's transported from refinery to airport, gasoline can't help picking up airborne dust particles, including sand and rust.

How to trap the little rascals

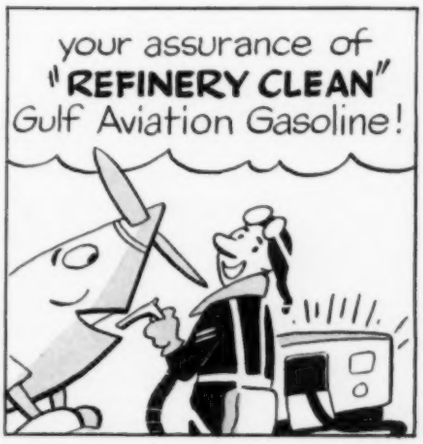
How can you trap these particles—keep them out of your engine? Not with fine mesh screens. And certainly not with ordinary filters. The *only* solution is to force the gasoline through specially designed filters—just ahead of the gasoline hose—before it goes into your tank.

So that's exactly what Gulf is doing for you. Gulf has installed filters on its Aviation Gasoline dispensing equipment, designed to completely remove all particles 10 microns in size or larger. From now on, for the sake of your engine and your own safety, go GULF . . . get gasoline that's *refinery clean*.

Gulf Oil Corporation . . .

Gulf Refining Company

GULF
AVIATION PRODUCTS



Lear Goes Into High Gear

The happy faces above are beaming over the outlook for increased commercial aircraft radio and autopilot sales as outlined by Bill Lear at a hard-hitting sales planning conference for his expanded sales force. That's Bill second from right, with Sales Manager Henry Hamm at right. Lear recently demonstrated his latest commercially-available product, the automatic approach coupler for L-2 (lightplanes) and L-5 (transports) autopilots. An altitude control was recently marketed for the autopilots. Lear is currently engaged in close cooperation with its distributors to achieve highest standards of factory-authorized service for users of Lear aircraft products.

into 14 foreign nations for the second week of the project. . . . **THE FIRST NATIONAL AVIATION EDUCATION WORKSHOP,** jointly sponsored by the Civil Air Patrol and the University of Colorado, was conducted last month at Boulder, Colorado. Participants were mostly high school and junior college teachers and instructors of CAP cadets, sent to the school by CAP wings. Students came from 25 of the 48 states, with Hawaii sending 18 and Alaska 2.

BIGGEST ALL-TEXAS AIR TOUR yet will be conducted Oct. 11-18, a 2,830-mile junket around the state. It starts from Temple. Overnight stops will be at Medina, McAllen, Galveston, Longview, Wichita Falls, Plainview, San Angelo and Mineral Wells.

TWO MARTIN B-26 EXECUTIVE TRANSPORTS are being readied at Los Angeles by AiResearch Aviation Service Company for Tennessee Gas and Transmission Co., of Houston, Texas. Tony Zuma is the pipeline company's transportation superintendent and Sid Pourchot, Jr., is pilot-crew chief.

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We know, from everyday contact and years of experience with them, that Cessna owners are successful in their business, are leaders in their business, and are flying for sound business reasons. We seek their patronage and work to retain it by offering them the most business-like aircraft servicing available — Factory-Authorized Cessna Service.

For busy people in business with their Cessnas, we specialize in nation-wide Cessna Flat-Rate Services. Every Cessna job has been carefully studied and analyzed. Records of past jobs are gone over and new methods applied for efficiency. The result is a job analysis which not only assures peak efficiency and minimum costs but enables us to quote dependable figures and schedule job completions with certainty. This eliminates delay and wasted time on the ground, allows busy executives to make more trips more frequently for full aircraft utilization.

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Cruse Aviation, Inc.
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Dal-Tex Aviation, Inc.
Highland Park Airport, Dallas, Texas

Hair Flying Service
Harding Field
Baton Rouge, Louisiana

Ragsdale Flying Service
Municipal Airport
Austin, Texas

Southwestern Skyways, Inc.
New Municipal Airport
Santa Fe, New Mexico

Kenneth Starnes Aviation Service
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West Texas Flying Service
Midland Airport
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Yingling Aircraft, Inc.
Municipal Airport
Wichita, Kansas

Questions and Answers for Airport Operators

How To Get Housewives Out To the Airport

QUESTION: The question I want to ask is an odd one. I have a small operation, almost what you would call a one-man operation, on a public airport. It's a one-runway field with a small, neat administration building, a 60-by-80-ft. hangar and seven T-hangars. My wife helps me out and I have one employe most of the time.

My operation includes gasoline, storage, some repair work, pilot training, some spraying and I have a four-place, late-model aircraft for charter service. I trade around in used aircraft a little and in the long run I make a living. We have no airline and no competition on the airport nor is there another airport in town. Our town is too small for competition.

The thing that worries me is that my airport is getting to be a lot like many others, purely a man's world. True, my wife is here a lot of the time and a model flying club I sponsor is bringing out a dozen or so youngsters on Saturdays. Of course, I see women flying occasionally, and on the airlines there are a lot of women passengers, but it seems to me that in general aviation we're not effectively selling the women. And they tell me there are more women of voting age than men.

Besides, I have a feeling that women have a direct influence on whether a lot of potential male customers fly.

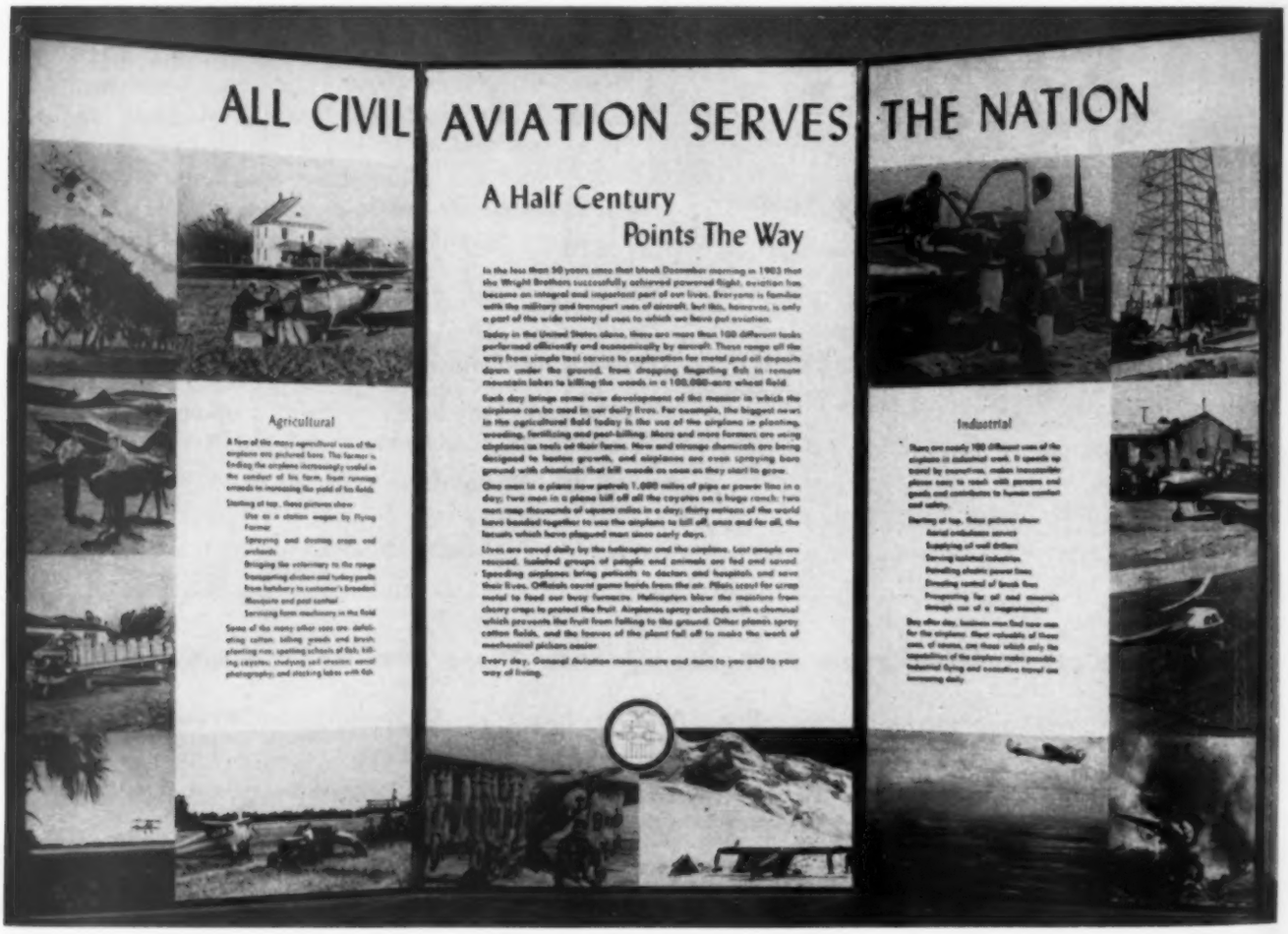
What I'd like for you to do is tell me how to bring this small-town airport in the women's side of our community, no more, no less than that. If I can get them out here, I'll run the risk of converting them one by one. But I don't know how to get them out of the kitchen or away from the canasta table.

ANSWER: This is a very dangerous question for a man to try to answer. As far as our wife knows, we know next to nothing about women, at least other women.

From the phrasing of your question we won't try to talk about women pilots, because if you had any in your town, they would be out at your airport. What you want is to bring your airport into the local world of women as well as that of men.

You have only limited facilities, such as an administration building, but no snack bar or other dining place. So your development of interest among the women must be a promotion.

You can plan a little program of talks to the two or three women's clubs and the card circles. But we don't think that will get you any



THE STORY OF GENERAL AVIATION AND ITS EXPANDING USEFULNESS is effectively told in a new series of displays which CAA has prepared. In triptych form, they are 3 ft. high and 6 ft. wide when opened. They are available on loan to libraries as a backdrop for displays on aeronautical books and will be furnished to schools on request. The displays fold to one-third size for parcel post mailing. Requests to borrow a display may be made to regional CAA offices or to the CAA's Office of Aviation Information, Washington 25, D. C. —(CAA Photo.)

UNDER THE ABLE LEADERSHIP of Edgar F. Smith, Jr., President, and Frank A. Spatz, Vice President and Treasurer, Kansas City Flying Service & Air College, Inc. is one of the country's outstanding fixed base operations. The firm conducts a C.A.A.-approved flight school and has nearly 90,000 square feet of hangar, shop and ramp space. Shops are large enough to accommodate DC-6 aircraft and are approved for all phases of aircraft and engine repair. Kansas City Flying Service does all servicing and maintenance for Continental, Chicago and Southern, and Ozark Airlines. *Texaco Aviation Lubricants and Fuels are used and sold exclusively.*

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place. It might but we don't think it will unless you're mighty convincing and have something concrete to offer.

The chances are there is a garden club or maybe two in your town. It's also likely that there isn't a posey or a bud brave enough to show its face around your airport. Yet we know of a town in Oklahoma which had an airport like that. The operator and city officials aroused the garden club's interest, prizes were offered and you should have seen the beautiful flower beds those women put in around the ad building and in the circle drive in front. They even put on a flower show in the lobby and crowds turned out to see their handiwork. The operator's wife told us the members and their husbands came back because they felt they had a share in making the airport more attractive.

The airport AND the women of the garden clubs got something out of that.

Frequently, demonstrators of kitchenware, new foods, appliances and cosmetics put on demonstration parties in private homes. Your wife will know about such things. Why wouldn't such parties go over big in your administration building if it's clean and attractive. We think you can get women out of the kitchen that way. Let your wife see what she can do.

As for the canasta tables, why not have your wife see what she can do with some bridge and canasta sessions in the lobby, too.

Those are just a few of the things you can do to draw women out to the airport. A fertile imagination will provide more and better ideas. Women's interests in affairs today are wide. Any local gathering of women is a target for your airport. If it takes a little money, that's the promotional gamble you're taking to develop interest and sales among the greater half of our population.

There are a few things, though, of which you want to be sure. First, keep the airport and the buildings clean and fresh inside and out. Keep the place a suitable one, attractive to women, but don't let anybody put up a lot of frilly curtains. That's sure to drive the men away.

See that the men around the airport tone down any tendency toward profanity. If any mechanic in greasy coveralls wanders through a lobby full of women, they won't like it.

See what you can do, and then tell us how it works out. And tell us how many customers you generate.

For Better Accounting

QUESTION: There is more and more of a movement to modernize the accounting systems for airports. The CAA, for that matter, has published a very fine pamphlet entitled "Business Accounting For Airports". I am for installing such a system for my own airport and I know a lot of other

managers who feel the same way. I am not having a lot of luck with the City Hall. The two major improvements which seem to be the stumbling blocks in my persuasive efforts are these:

(1) Why should we install a system that breaks down our costs and revenues into separate figures for the landing area, for the terminal area, for the hangar area and for management sales?

(2) Why should we change municipal accounting philosophy from a cash basis to an accrual basis?

I think I know the answers but I have not been able to make them convincing enough to sell a bill of goods to the city comptroller. Can you tell me the answers? Those are the only two points I want you to answer, but cover them please to the best of your ability.

ANSWER: Let's take the first one. You want to know the benefit to be derived from segregating costs and revenues in the various elements mentioned in your question. Theoretically the reason for recommendations along those lines is in the need to know what your costs are for each of the major elements of operation in order that you may determine whether your revenues are properly distributed. Under certain conditions one of your elements, such as the landing area, may have maintenance and operation costs much in excess of your revenues from that source. This is frequently true where the number of flights paying landing fees in no way reaches the capacity of the landing area, and it is not intended here to imply that in such cases that unit should pay absolutely all its own costs. Very frequently in such circumstances it is found that the terminal area shows an excess of revenue over costs of operation and this revenue may be applied to the deficits in the landing area figures.

On the other hand, the purpose of this segregation into separate accounts is to give to management the knowledge needed to enable management to bring about the most reasonable and efficient economies possible in the weak elements and to bring up the revenues in those same elements without going beyond reasonable rates and charges.

If you were running a dairy whose principal products were milk, cream, butter and ice cream, you would want to allocate your costs of material and processing on each of those four items in order to measure those costs against the revenues derived from each of the four. In a sense you would not be able to raise the price of butter if you were losing money in that department purely on a cost basis. You would have to consider competition and ceilings. You could not cut the quality of your product because of the normal laws and regulations gov-

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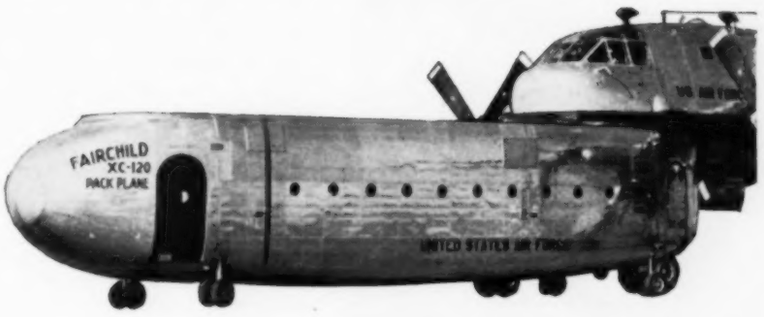

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erning such products. But you might very seriously consider changes in packaging, volume, merchandising, modernization of equipment that might lower your costs. That applies to any one of the products you sell. The accounting system segregates costs and revenues and then serves as a pointer to indicate where need for improvement lies. However, if all the dairies in your town have the same kind of accounting system and experience the same cost and income ratio on a particular segment, you may be sure that they would join forces to remedy the situation. Now that same indication of the need is one of the natural results of good business accounting at airports.

As for the advantages of an accrual system over a cash system, it seems that that is more readily understood. If on your field, for instance, you have been working like the devil to bring your revenues up to the point where they exceeded your expenses, if you operated on a cash basis, your total income for the year would be represented by what your tenants and users paid you and your total costs would be represented by the money you paid out. Under an accrual system the payments which fall due from your tenants and users within a year are considered rather than the actual cash taken in. If you have one customer whose rent in the last month of the year amounts to $3,000 and he does not pay that $3,000 until the day after your fiscal year ends, then you do not consider the $3,000 in the year in which it was earned but in the year in which it was paid. In a close operation this might throw you into the red whereas actually you belong in the black because that $3,000 under an accrual system would be in accounts receivable.

Likewise, you might have paid during that year $12,000 for fire and windstorm insurance on all your buildings for three years. Under a cash system that $12,000 in total would be considered as an expense for that first year only, whereas under an accrual system you would only charge to expenses the amount for one year with the remaining two years premium shown as prepaid expenses. In an accrual system too, you are able to recognize some of the costs that actually are incurred but are not paid after the initial capital investment is made. Those costs are represented principally by depreciation of the sponsor's share of the capital costs of construction or improvement. They do represent as depreciation an accrual cost which is not recognized in a cash system. Now those are the best reasons we know as answers to your two questions. We hope they are clear to you and that you can use them. ★ ★ ★

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MY NEW 4-PLACE

(Continued from page 18)

then result in a lower speed potential.

At this point we should make reference to an important handicap facing contemporary 4-place designs. In the rush for speed, wing spans and wing areas have been reduced to the small side. It so happens, and can be readily proven, that wing loadings should be low for low landing and take-off speeds, while low span loadings have a great effect on improved climb and high ceilings. While few people want to go above 20,000 ft. in an unpressurized aircraft, the fact does remain that an aircraft having a high ceiling also has greater utility at fields at high elevations such as in mountainous areas, on hot days, and in small fields. Cruising at altitude is more efficiently done with such an airplane, since it can get up quickly, and fly efficiently once there.

To illustrate our point, this characteristic is well developed in the single-seater Mooney Mite design. While conventional 4-place aircraft really struggle at altitudes above 10,000 ft. when fully loaded, the little Mooney Mite really sails along "on the step" at 15,000 ft., 16,000 ft. and higher. Its useful ceiling is limited only by the pilot's altitude capabilities or bottled oxygen supply.

But let's go farther into the new 4-place Mooney's basic features. Since a given and important design requirement for us is a landing speed of not more than 45 mph., the wing loading, even with efficient, 70 per cent-span slotted flaps, may not be over 12 lbs. per sq. ft. A span loading of not over 60 lbs. per foot of span was determined as basic to a high ceiling. After the weight estimation was accomplished, the wing size finally decided upon resulted from several successive refinements of the weight and wing size computations.

In summary, the selected wing span and area take advantage of the low-drag, laminar-flow airfoil by sharply increasing the climb and ceiling with the desired power by means of an increased span, by obtaining the desired landing speed with a suitable area, while maintaining an advantage in speed because of the lower profile drag of these airfoils.

In regard to parasitic, or non-lifting, drag, if it is true that a low-span loading is the god-father of climb and ceiling, it is also true that the minimum possible parasitic drag is the hand-maiden of speed. After all, there is no mystery about speed. All that the engine has to do is overcome drag by supplying propeller thrust. Having made a good start in drag reduction

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"THIS YEAR MORE PILOTS WILL STOP AT **TRADEWIND** IN AMARILLO"

with a properly proportioned laminar-flow wing of adequate area, the final step in our first basic problem is to evolve a fuselage shape of the lowest possible drag.

This has been accomplished by working out a structure, partially illustrated in the accompanying drawing, which allows a substantial reduction in frontal area while maintaining the required internal head-room and width, and the required unobstructed interior. The aerodynamic form is of cleaner external lines than any contemporary type, since the lower fuselage corners have a smoothly rounded carry-through for reduced drag at high speed, representing an advance over the leading contemporary in this respect. A sharper prow for the engine lower cowling has been carefully designed to improve the flow over the wing-roots, and further reduce the drag in this respect.

Our second major decision concerns structural design. Having chosen an aerodynamic configuration and basic design of great promise, it is apparent that the ability to accomplish the second basic requirement of low weight is the difference between a remarkable airplane or "just another airplane."

Considerable research and study on structural and other weights was accomplished at this point. While a great deal has been said and written about the possibilities of ultra-light and light all-metal structures, the fact remains that there does not seem to be a practical example of them in the 4-place category, especially in the internally-braced type.

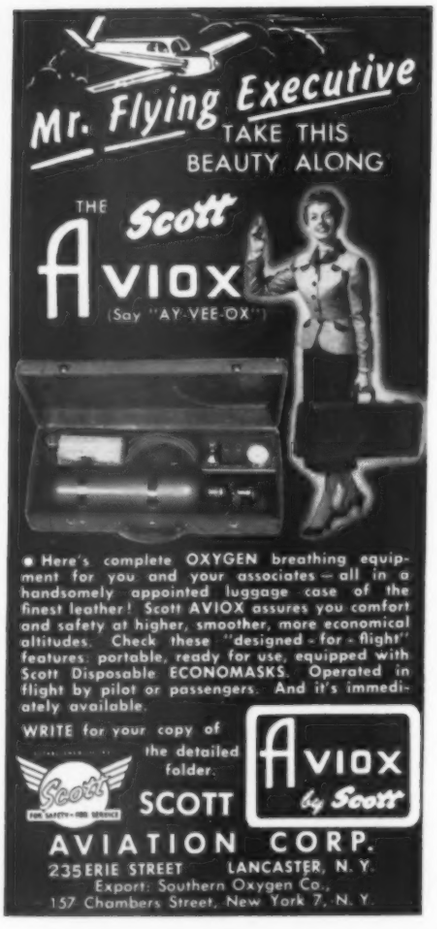
To point up this statement, the full 4-place, aerodynamically clean models carry about 1,000 lbs. of useful load, while grossing from 2,700 to 2,850 lbs. The ratio of useful to gross weight could be improved. In fact, better ratios were obtained many years ago in comparable-size aircraft using composite construction as indeed the Bellanca does to this day. An early airplane designed by the author, with a 36.5-ft. internally-braced wing, grossed only 2,400 lbs. while carrying 1,120 lbs. of useful load. It was also approved for load factors over 50 per cent greater than now used.

To illustrate further, the Mooney Mite wing, with a high aspect ratio and a fairly thin root section, weighs 1.3 lbs. per sq. ft. including flaps and ailerons, and has established a deserved reputation for ruggedness. If a metal wing of similar aspect ratio, thickness, wing-loading, size and load factors weighed less than 2 lbs. per sq. ft., it would be hailed as a great achievement.

From these and many similar considerations, we are forced to the conclusion that the new 4-place Mooney's design requirements can only be attained at this time by the careful, precise use of composite structural design of the type proven in the Mooney Mite design.

The alternative would be to abandon the chance to obtain the desired balanced performance in the medium-price field, go to an all-metal structure, accept a higher weight requiring higher power, and end up at the top-price level with only a speed advantage.

Accordingly, a decision was made to



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develop the 4-place Mooney around the composite type of structure, *based solely on engineering considerations.*

The Mooney Series Twenty's wing is of one-piece, internally-braced construction, combining a single main-box-spar with a plywood torsion box, and having a straight tapered plan form. Conservative laminar-flow airfoils are so disposed across the span as to result in least drag and in superior stalling qualities. Efficient slotted flaps of 70 per cent span and narrow constant chord are provided. Sealed-gap ailerons with differential action are used.

The cabin fuselage section is of welded steel tube structure uniquely designed to permit unobstructed windows, doors and cabin interior. This design results in a smaller frontal area for a given interior size. It also provides an effective impact-resisting "island structure" around the occupants. Cabin structure is covered by a light alloy skin, finely streamlined. Interior cabin width is 42 ins. clear, the head-room is 38 ins. for all seats, and the leg-room is from 35 to 40 ins. in the front and from 35 to 39 ins. in the rear. The cabin floor has no obstructions from the rear seat to the firewall and the right front and rear seats are quickly removable for cargo. An outside door provides easy access to the baggage compartment. The rear fuselage structure is a plywood cone with internal formers and stringers. It is covered with high-grade fabric and is bolted to the cabin section structure.

All three wheels of the landing gear are the same size—6.00 by 6. Shock units are a special rebound-controlled assembly of rubber discs which position the wheel mounting spindles. This eliminates air and oil struts. The entire gear is flush retractable by means of a simple hand lever between the front seats, and gear cover doors are provided. The nose wheel is steerable through the rudder pedals.

A feature brought over from very successful application on the single-seater Mooney Mite is the Mooney "Safe Trim" system, in which a single control operates the adjustable stabilizer and wing flaps through push-pull linkage which accomplishes longitudinal trim and flap control.

As for our composite construction, we fully realize that all-metal adherents will ask questions. We wish to emphasize again that this construction was selected from engineering considerations. At the same time, our elimination of critical materials to a great extent in this design has simplified

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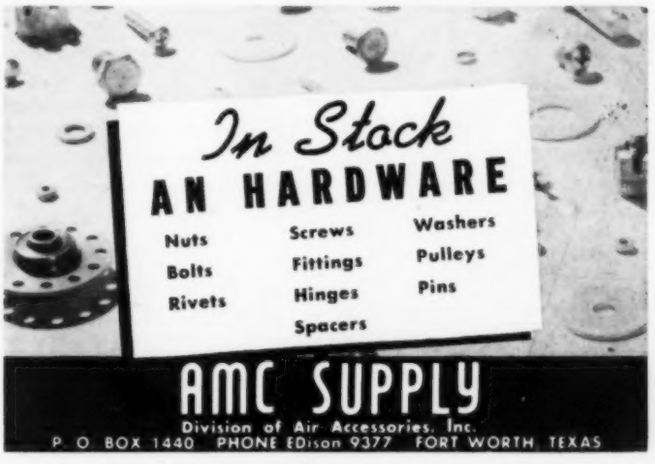

the problems of introducing the airplane to the present market. Also the problem of tooling and of obtaining material for tooling has thus become a minor one—if the construction had been all-metal, tooling would be difficult and perhaps impossible at this time.

Now let's look into a topic which is receiving more and more emphasis in hangar talks. Sooner or later, jet engines and prop-jets are going to be available for deluxe personal and executive aircraft. Mark our words when we say that laminar-flow wings will become a basic requirement for such aircraft if most efficient performance is obtained. Our new 4-place has great possibilities in this direction and we shall remain alert to opportunities.

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When we begin flying the new 4-place this Fall, we expect it to prove itself as one of the most efficient 4-place airplanes ever offered. We also expect it will have sufficient market acceptance to justify all of the engineering which has gone into it. It is too early to mention specific prices but the new Mooney Series Twenty will definitely fit into the medium-price bracket, at which it will also prove a profitable airplane not only for our customers who will use it but for our company and its distributors. Nobody will benefit from a loss-sale promotional introduction of a new 4-place airplane. We mention this because we think it is basic to air progress, and that is what the customer is interested in. And we are convinced that our new 4-place Mooney will offer advancement in safety, comfort, performance, reduced maintenance and efficient economy. ★ ★ ★

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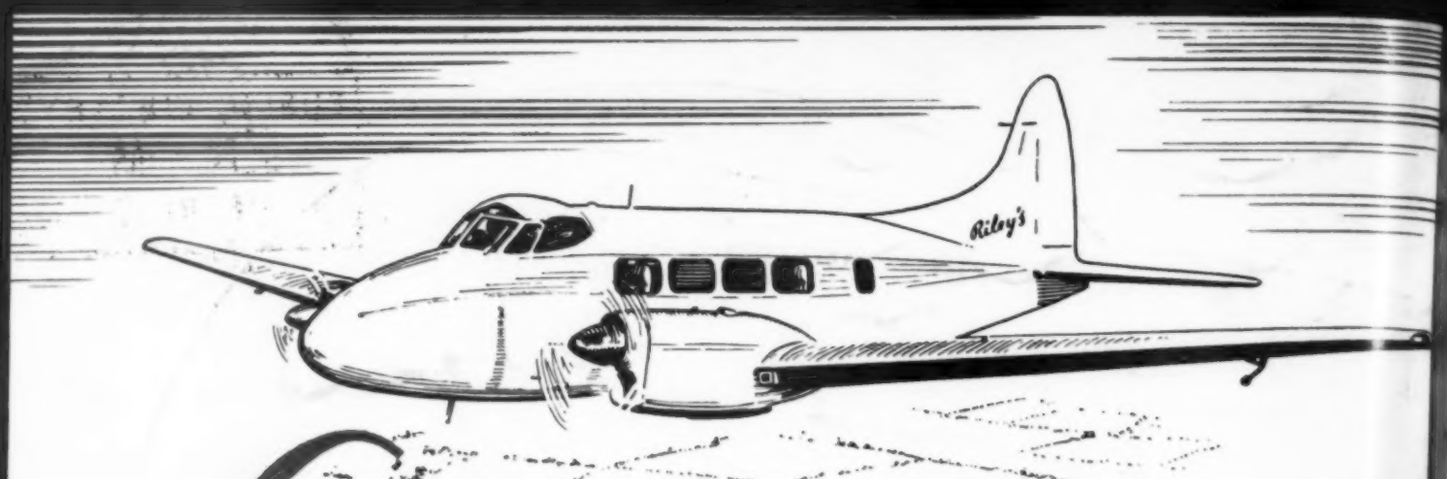

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